Crosswalk Safety in Nova Scotia

The Final Report of the Crosswalk Safety Task Force

2007

ACKNOWLEDGEMENTS

The Crosswalk Safety Task Force would like to take the opportunity to acknowledge all those that assisted, participated, and presented to the Task Force:

Janet Barlow, Coordinator Active Transportation (Ecology Action Centre); Ann Blackwell, Director, English Program Services (Dept. of Education); Sarah Chisholm, Traffic Engineering Technician (Transportation & Infrastructure Renewal); Christine Eisan, Research and Policy Analyst (Road Safety, Transportation & Infrastructure Renewal); Natalie Flinn, Active, Healthy Living Consultant (Department of Education); Michelle Higgins, Senior Solicitor for TIR (Department of Justice); HRM Staff; Catherine Kennedy, Research and Statistical Officer (Injury Prevention, Department of Health Promotion & Protection); Terry Mills, Manager Research and Analysis (Policy & Planning, Transportation & Infrastructure); Erin Nauss, Solicitor for TIR (Department of Justice); Gary Sellon, Statistical Analyst, Traffic Accident Team (Transportation & Infrastructure Renewal); Paul Smith, Road Safety Engineer (Transportation & Infrastructure Renewal); Sgt. Michael Spearns (Halifax Regional Police); Julie Stover, RSAC Coordinator (Transportation & Infrastructure Renewal); and fellow Task Force members.

The Task Force appreciates all those individuals who took the time to share their concerns, thoughts, and ideas.

Without the assistance of the individuals listed and those that took the time to write to the Task Force, this report and these recommendations would not be possible.

MESSAGE FROM THE CHAIRS

Collisions between vehicles and pedestrians are catastrophic events that touch many lives. These collisions not only cause anguish to those that are directly involved, but also the many friends and family members of the victims. The nature of these collisions makes them heartbreaking, and it is necessary to do everything practical to prevent them from occurring on our roadways.

Investigations of vehicle-pedestrian collisions often identify many contributing factors; determining one single cause is not only difficult but also sometimes impossible. Investigations into pedestrian collisions quickly reveal that preventing such collisions requires a multi-faceted approach exploring the roles of engineering, enforcement and education in crosswalk safety; and there are a range of factors that play a role in guiding both motorists and pedestrians in their behaviour at pedestrian crossings.

The Crosswalk Safety Task Force (Task Force) completed its work independently and transparently. The Task Force heard from experts in the fields of traffic and transportation engineering, education, and law enforcement; and carefully reviewed all submissions from the public. The recommendations presented in the report are the product of information gathered from the public, expert and professional experience, literature review, and research reviewed by the Task Force.

The Co-Chairs of the Task Force would first like to thank two individuals who, without their efforts, the work of the Task Force may never have been completed. The coordination of our work was the responsibility of Ms. Julie Stover and Ms. Christine Eisan. Their patience, efficiency, and disciplined approach to the organization of the Task Force guided us through the process of research, discussion, and conclusion. Ms. Eisan's efforts played a critical role in the documentation of our work and the preparation of the final Report.

The efforts of a Task Force could never be completed without the dedicated involvement of its membership. Each of the members of the Task Force contributed greatly to the review process and the development of the final report. The Task Force members gave freely of their time and demonstrated their commitment through the many meetings and many more hours spent researching and reviewing documentation related to crosswalk safety.

We would also like to thank His Worship Peter Kelly, Mayor of Halifax Regional Municipality and the former Minister of Transportation and Public Works, Angus MacIsaac. The Mayor and the Minister provided encouragement and transparency in the development and operation of the Task Force. The Mayor and Minister MacIssac, as well as the present Minister, Murray Scott, have demonstrated their passion, commitment and dedication to improving crosswalk safety.

Finally, we would like to thank the public who are responsible for keeping the issue of pedestrian safety at the forefront of issues requiring regular review. The many submissions from the people of this province demonstrated the passion that we, as citizens, are capable of showing when an issue of great importance touches our hearts.

Regards,

Bernie Clancey, P. Eng
Manager of Traffic Engineering,
Deputy Provincial Traffic Authority
Transportation and Infrastructure Renewal

Ken Reashor, P. Eng.
Manager of Traffic & Right of Way Services
Traffic Authority
Halifax Regional Municipality

GLOSSARY

Active Transportation: Any form of human-powered transportation - walking, cycling, wheeling, in-line skating, skateboarding, ice skating (eg. on a canal), etc. It can also involve combining modes such as walking/cycling with public transit.

Coordinated Traffic Signals: Traffic signals that communicate with each other, allowing them to work together. Signal coordination synchronizes the start and end of green lights along a series of traffic signals to allow for the uninterrupted flow of traffic between these traffic signals, minimizing unnecessary stops. Signal coordination is usually used along busy arterial streets where there are a number of traffic signals in succession.

Crossing marked crosswalk, no signal: A pedestrian is crossing at a marked crosswalk with pavement markings, but not at a fully signalized intersection i.e. don't walk and walk signals.

Crossing no signal or crosswalk: A pedestrian is crossing at a location without a marked crosswalk and no signals i.e. unsignalized intersection with unmarked crosswalks. See unmarked crosswalk.

Crossing with signal: A pedestrian is crossing at a location that is a fully signalized intersection with the "walk" signal activated. This does not include midblock crossings with overhead pedestrian activated beacons.

Crosswalk: An area of the roadway where pedestrians have the right of way for crossing.

Defensive Driving Course: A six (6) hour course that teaches drivers to operate a vehicle in safety, in spite of the actions of other drivers and the conditions around the driver.

Highway: A public highway, street, lane, road, alley, park, beach or place including the bridges thereon, and private property that is designed to be and is accessible to the general public for the operation of a motor vehicle.

Luminance: Luminance is the amount of visible light leaving a point on a surface in a given direction

***Manual of Uniform Traffic Control Devices for Canada* MUTCDC:** - A manual published by the Transportation Association of Canada to encourage uniformity throughout Canada and compatibility throughout North America with respect to traffic control devices.

Marked Crosswalk: Any portion of a roadway clearly indicated for pedestrian crossing by lines or other markings on the surface

Markings: See Pavement Markings

Medical: A department medical form issued by the Registrar and completed by a physician who is familiar with the driver's health.

Midblock Crossing: A marked crosswalk that is not located at an intersection.

Motor vehicle: A vehicle, as herein defined, which is propelled or driven otherwise than by muscular power.

Multi-lane Highway: A highway with more than one lane running in the same direction.

Pavement Markings (Markings): Marks placed on the pavement with paint or other materials to guide road users.

Pedestrian activated beacon: A flashing amber light activated by a pedestrian to indicate to drivers of vehicles on a roadway that the pedestrian is crossing, waiting, or about to cross the roadway.

Pedestrian Activated Signal: A traffic signal that allows a pedestrian to call for a change to the traffic signal display.

Pedestrian: A person on foot; includes a person using a wheelchair, but does not include a cyclist when mounted on a bicycle.

Re-examination: A re-examination of a driver by a Driver Enhancement Officer (DEO), which consists of a vision, rules/signs test and a road test. The DEO submits a written report to the Registrar concerning the assessment of the driver on the above tests.

Retroreflective: The ability to return light to its source. E.g. When the light from a car's headlights strike a retroreflective sign, the light is directed back toward the car, such that the sign appears illuminated to the driver.

Right-of-way: The privilege of the immediate use of the highway.

Road Authority: A public agency responsible for the administration and control of a public highway/street system.

Roadway: A portion of a street or highway between the regularly established curb lines or that part improved and intended to be used for vehicular travel.

School Area (Zone): Any portion of a highway designated as a school area by erection of a sign when children are present on the portion of the highway or land adjacent to that portion of the highway.

Traffic Authority: A provincial or municipal employee that has been so appointed by the province or a municipal council.

Traffic Operations and Management Standing Committee (TOMSC): A national standing committee of the Chief Engineers' Council of the Transportation Association of Canada. Its purpose is to develop standards for traffic control devices and practices for use in Canada.

Traffic Signal Head (Signal Head): The portion of the traffic signal system that contains the illuminated traffic signals.

Transportation Association of Canada (TAC): A national association with a mission to promote the provision of safe, secure, efficient, effective and environmentally and financially sustainable transportation services in support of Canada's social and economic goals.

Uncontrolled Crosswalk: No traffic signals or stop signs are present.

Unmarked Crosswalk: A portion of a roadway ordinarily included within the extension or connection of curb lines and property lines at intersections.

Unsignalized Intersection: No traffic signals are present

TABLE OF CONTENTS

Acknowledgements i

Message from the Chairs ii

Glossary iii

Table of Contents v

List of Figures vii

An Overview of Crosswalk Safety in Nova Scotia 1

Summary of Recommendations 2

Recommendations 3

Introduction 9

Background 10

Current Situation 16

Road Safety In Nova Scotia 16

Nova Scotian Pedestrian Collision Statistics 23

Interim Report of the Crosswalk Safety Task Force 38

The Role of Engineering in Crosswalk Safety 41

Crosswalk Installation Practices in Nova Scotia 41

Hierarchy of Standard Marked Crosswalk Treatments 44

Marking of Crosswalks 47

The Role of Education in Crosswalk Safety 51

Crosswalk Education in Nova Scotia 51

Crosswalk Education Through One's Lifespan in Nova Scotia 52

The Need for A Comprehensive Education Plan 56

Opportunities & Challenges for Educating Children & Youth On Crosswalk Safety 56

Opportunities & Challenges: Educating Drivers & Adult Pedestrians 58

The Role of Enforcement in Crosswalk Safety 62

Traffic Enforcement in Nova Scotia 62

Traffic Policing Methods 64

Enforcement & Education 69
Enforcement & Penalties 71
Discretionary Authority of the Registrar 73
The Role of Evaluation in Crosswalk Safety 75
Data and Crosswalk Safety 75
Accountability & Crosswalk Safety 76
Public Submissions on Crosswalk Safety 78
Engineering 78
Education 90
Enforcement 93
Concluding Observations 99
References 101
Appendices I
Appendix A: Terms of Reference II
Appendix B: Membership of the Crosswalk Safety Task Force IV
Appendix C: Presentations VI

LIST OF FIGURES

Figure 1: Vehicle Speed & Stopping Distances 18
Figure 2 Pedestrian Collisions by Urban & Rural Locations (1986-2005) 24
Figure 3 Pedestrian Collisions/ 100,000 Population (1986-2006) 25
Figure 4 Pedestrian Fatalities from Pedestrian Collisions (1986-2006) 26
Figure 5 Pedestrian Collisions by Pedestrian Age: 5-15 (1986-2006) 27
Figure 6 Pedestrian Collisions by Pedestrian Action -- Running into Road (1986-2005) 27
Figure 7 Pedestrian Collisions by Pedestrian Age (2005 & 2006) 29
Figure 8 Pedestrian Collisions by Driver Age (2006) 30
Figure 10 Contributing Factors in Marked Crosswalks (1996-2005) 32
Figure 9 Pedestrian Collisions by Vehicle Manoeuvre-- Going Straight Ahead (1986-2005) 32
Figure 11 Contributing Factors in Unmarked Crosswalks (1996-2005) 33
Figure 12 Pedestrian Collisions by Vehicle Manoeuvre (1986-2006) 33
Figure 13 Pedestrian Collisions by Pedestrian Action-Crossing Marked Crosswalk, no Signal (1986-2006) 34
Figure 15 Pedestrian Collisions by Pedestrian Action-Crossing no Signal or Crosswalk (1986-2006) 35
Figure 14 Pedestrian Collisions by Pedestrian Action-Crossing with Signal (1986-2006) 35
Figure 16 An Example of Advance Yield Markings 84
Figure 17 Samples of Pedestrian Specific Signs 86
Figure 18 An Example of a Pedestrian Ramp Design Example 89

LIST OF TABLES

Table 1: Comparison of transportation modes used by children to get to school 2001 & 2005 28
Table 2: Regulatory Signs 43
Table 3: Warning Signs 43
Table 4: Characteristics & Abilities of Different Pedestrians 54
Table 5: Pedestrian-Motor Vehicle Collision Investigations 72
Table 6: Summary Offence Regulations & Penalties for Drivers 94
Table 7: Assignment of Demerit Points & Category of Driver 94
Table 8: Summary Offence Regulations & Penalties for Pedestrians 96

AN OVERVIEW OF CROSSWALK SAFETY IN NOVA SCOTIA

The citizens of Nova Scotia have expressed concerns for the safety of pedestrians in crosswalks. In response to this, the Minister of Transportation and Infrastructure Renewal (TIR) and the Mayor of Halifax Regional Municipality (HRM) appointed the Crosswalk Safety Task Force (Task Force) in April 2007.

The objective of the Task Force was to identify strategies and measures to improve crosswalk safety in Nova Scotia. It was responsible for reviewing research, reports, and background materials. With this guidance, the Task Force accepted both formal and informal submissions and solicited presentations from experts and stakeholders. This work formed the basis of this Report and its Recommendations.

The work of the Task Force revealed some important themes regarding crosswalk safety; first among these is that a number of factors influence crosswalk safety. The Task Force believes improved crosswalk safety is possible when included as part of a road safety strategy that considers the combined influences of engineering, education, and enforcement. Regardless of the precautions created through engineering measures, education campaigns, and law enforcement efforts, the responsibility for safety ultimately remains with the pedestrian and driver. In order to create a safe roadway network, we as pedestrians and drivers must be attentive and accountable for our actions.

The Task Force released an interim report in late summer. This report outlined a series of legislative recommendations clarifying and emphasizing the role of drivers and pedestrians in crosswalk safety.

Through the presentations, submissions, and research the Task Force has learned a great deal about crosswalk safety. This Report documents the findings and resulting recommendations of the Task Force.

The following section provides a summary of the Report's themes and Recommendations.

SUMMARY OF RECOMMENDATIONS

The following is a summary of overarching themes of the Report & Recommendations made by the Task Force. Please see pages 3-8 for all Recommendations.

ROAD SAFETY

The Task Force recommends the departments responsible for road safety develop a coordinated, comprehensive, & evidence-based road safety strategy.

PEDESTRIAN COLLISION STATISTICS

The Task Force recommends the departments responsible for collecting & analyzing collision data do so in a timely, comprehensive, consistent, & accurate manner.

ENGINEERING

The Task Force recommends the Provincial & Municipal Traffic Authorities install crosswalk treatments based on technical merit & national standards to ensure consistency & uniformity for drivers & pedestrians.

EDUCATION

The Task Force recommends government develop a comprehensive crosswalk safety strategy, giving priority to those groups most at risk. Crosswalk education must be comprehensive, & targeted, with the right resources for the right audience; & delivered at the most appropriate time & in the most appropriate way.

ENFORCEMENT

The Task Force recommends law enforcement agencies use a collaborative approach to enforcing road & crosswalk safety. RCMP & Municipal Traffic Services must provide law enforcement officers, especially frontline officers, with professional development opportunities & adequate & appropriate resources.

EVALUATION

The Task Force recommends the government commit to conducting rigorous evaluations of all strategies used to increase crosswalk safety.

FUNDING

The Task Force recommends government dedicate & sustain funding towards engineering, educational, enforcement, & evaluation strategies that promote, educate, enforce, & enhance crosswalk safety.

RECOMMENDATIONS

Recommendations are organized by topic and numbered in order of appearance.

ROAD SAFETY

1. *The Road Safety Advisory Committee (RSAC) must support the Department of Health Promotion and Protection's (HPP) alcohol strategy by dedicating a member to assist with the development and implementation of an alcohol impaired driving strategy.*

PEDESTRIAN COLLISION STATISTICS

2. *Government must undertake a review of the current method of collision data collection to improve the accuracy and reliability of that data.*

ENGINEERING

3. *Provincial and Municipal Traffic Authorities should meet on a regular basis to discuss, among other traffic engineering topics, pedestrian and crosswalk safety.*

4. *To ensure consistency and uniformity across the province in the installation of marked crosswalk treatments, the province and municipalities must use a consistent approach, based on technical merit.*

5. *The road authority must require the assessment of existing marked crosswalks when refurbishing highways and roadways to ensure they reflect current traffic situations, guidelines, and standards. Where existing marked crosswalks are not warranted they must be removed due to potential safety hazards.*

6. *Prior to construction, designers of highways, roadways, and streetscapes must examine the needs of all road users to ensure that the final product provides appropriate and safe facilities for all road users.*

7. *The province and municipalities must stay current in their knowledge of new crosswalk and pedestrian control devices and monitor the success of these devices. The province must encourage and approve pilot projects prior to the use of the device to determine its durability, installation and maintenance requirements, effectiveness, and feasibility.*

8. *Municipalities interested in conducting a pilot project must seek approval from the Office of the Provincial Traffic Authority, as all pilot projects must be subject to an approval process.*

9. *The province and municipalities provide fixed funding to be allocated for the purposes of research and pilot testing of crosswalk devices.*

33. a. *The province and municipalities must remain consistent with the Manual of Uniform Traffic Control Devices for Canada (MUTCDC) and install crosswalk treatments according to MUTCDC practices.*

    b. *Municipalities in Nova Scotia using signs other than those prescribed by the MUTCDC for crosswalks should change those signs to conform to the manual.*

34. *Pedestrian activated beacons continue to follow the national standard. In an effort to add conspicuity to pedestrian activated beacons, municipalities and the province should consider introducing a program to upgrade amber pedestrian beacons to 300 mm (12") LED lenses.*

35. *Municipalities and the province should undertake a program to update pedestrian activated beacon installations to enable the extension of the signal when the pedestrian button is re-activated. Priority should be given to those installations where frequent pedestrian crossings are anticipated.*

36. *Further pilot studies should be conducted to determine the long term effects of advance yield markings and signs on driver yielding distance and compliance at crosswalks on multi-lane approaches.*

37. *Crosswalk markings should be maintained by the municipality and/or the province to keep them as legible as is practical.*

38. *Pedestrian specific signs should be considered to provide pedestrians with feedback and reminders to cross safely. These devices should only be installed where there are pedestrian control devices (i.e. walk/don't walk signals, pedestrian activated beacons) and where they have been determined to have technical merit.*

39. *Municipalities and TIR should consider installing raised pedestrian refuges for new and redesigned highways when those highways have more than two lanes in each direction. Refuges should be constructed to allow ample space for wheelchairs, etc. to wait for a crossing opportunity.*

40. *The province and municipalities must adopt HRM's current pedestrian ramp design as a provincial standard.*

41. *Municipalities and the province must follow the Transportation Association of Canada (TAC)* ***Guidelines for Understanding, Use and Implementation of Accessible Pedestrian Signals*** *when considering accessible pedestrian signals to ensure uniformity and consistency.*

10. *Parents, family members, and others who help care for young children need support through the provision of appropriate educational resources to help them develop and encourage safe crosswalk behaviour in this vulnerable young age group.*

11. *The Department of Education (DoE) designate a person to join RSAC to provide support and expertise on road safety education issues related to school age children and youth to ensure the curriculum incorporates crosswalk safety education.*

12. *The Departments of Transportation and Infrastructure Renewal (TIR) and Health Promotion and Protection (HPP) should support DoE in revising existing areas of curriculum where injury and safety is a focus, and where crosswalk safety education is an area of concern.*

13. *Review Nova Scotia's Crossing Guard training program to create a standard program that clarifies the crossing guard's role in crosswalk safety education for children.*

14. *The RSAC member departments[1] should consider age-related changes to driving ability and driver competency when developing a provincial road safety strategy.*

15. *The RSAC member departments should consult with the Department of Seniors, and other seniors' organizations to identify opportunities for driver-education to support older adults to continue to drive safely and reinforce the rules of crosswalk safety.*

16. *The RSAC member departments continue to research crosswalk safety and conduct pilot projects for crosswalk safety education where promising practices exist.*

17. *Service Nova Scotia and Municipal Relations (SNSMR) and TIR should examine existing education resources for new drivers, particularly youth, around areas of driver behaviour that relate to pedestrian safety.*

18. *SNSMR ensure driving school instructors are knowledgeable about crosswalk safety, and that it be made a mandatory component of their classroom curriculum and in their in-vehicle instruction.*

[1] The RSAC member departments include the Departments of Transportation and Infrastructure Renewal, Service Nova Scotia and Municipal Relations, Justice, and Health Promotion and Protection.

19. *The provincial police service (RCMP) Traffic Services Division and Municipal Police Agencies, are encouraged to meet on a regular basis to discuss traffic enforcement matters; ensuring front-line law enforcement officers are represented.*

20. *The province is encouraged to identify a department and assign an individual responsible for coordinating traffic service division forums and maintaining regular communication with law enforcement officers regarding road safety matters, including pedestrian and crosswalk safety.*

21. *TIR, SNSMR, and the Department of Justice (DoJ) should explore and take any opportunities to enhance and clarify the Motor Vehicle Act (MVA) to enable law enforcement officers to enforce the Act effectively and efficiently. The Task Force is advancing two areas of priority:*
    a. *TIR and SNSMR should jointly pursue amendments to legislation and regulations to reintroduce all vehicles (personal and commercial) to require both front and rear license plate.*
    b. *TIR and DoJ should jointly pursue amendments to the legislation and regulations to enable law enforcement officers to issue summary offence tickets based on license plate identification alone.*

22. *TIR, DoJ, and SNSMR explore the feasibility of amending legislation and regulations to provide legislative authority for Electronic Summary Offence Tickets (E-SOT).*

23. *The RCMP and municipal police agencies publicly and formally identify speeding as a public safety priority and explore methods of enhancing their enforcement efforts.*

24. *Speeding countermeasures should be developed and include public awareness campaigns combined with concentrated enforcement of speeding with the objective of reducing the average traveling speed, incidents of speeding, and zero tolerance for speeding in school zones.*

25. *The province and municipalities identify the staffing of traffic services positions as a provincial road safety priority.*

26. *The RCMP and municipal police agencies communicate to frontline law enforcement officers the importance of completing pedestrian collision reports in an accurate and timely manner.*

27. *The RCMP and municipal police agencies review the role of their school liaison officers in traffic and crosswalk safety education to determine the most efficient use of their abilities and time.*

28. *Policing agencies must explore the feasibility of publishing a reference manual that consolidates all speeding and crosswalk violations.*

29. *The government, RCMP, and municipal police agencies must dedicate funding towards traffic enforcement to promote, educate, and enforce traffic and crosswalk safety effectively.*

EVALUATION

30. *The RSAC member departments and relevant agencies improve their systems and processes to collect, analyse, and share the data critical to understand and address crosswalk safety.*

31. *RSAC ensure formal evaluations of programs, polices, and strategies related to crosswalk safety are conducted.*

32. *RSAC ensure an annual report regarding the implementation status of the recommendations is released to the public; and after five years, a formal review of crosswalk safety programs, policies, and strategies is conducted.*

CONCLUDING OBSERVATIONS

42. *The departments responsible for enhancing road safety must develop a comprehensive road safety strategy that is evidence-based and combines engineering, education, and enforcement countermeasures. The province must dedicate funding and resources to enhance, support, and maintain road safety initiatives and encourage Nova Scotians to accept road and crosswalk safety as a shared responsibility.*

The Task Force proposed the following recommendations in the *Interim Report of the Crosswalk Safety Task Force*[2].

- *"Yield the right of way to a pedestrian" means the operator of a vehicle is required to stop to avoid endangering, colliding with or interfering in any way with pedestrian travel."*

- *'don't walk' light - Pedestrians facing this signal, either flashing or solid, shall not start to cross the highway in the direction of the signal; and pedestrians who have legally and partially crossed the highway shall continue to proceed and complete their crossing.*

Driver Responsibilities

- *Where pedestrian movements are not controlled by traffic signals, the driver of a motor vehicle shall yield the right of way to the pedestrian lawfully within a crosswalk or stopped facing the crosswalk.*
- *Whenever a vehicle has stopped at a crosswalk or at an intersection to yield to a pedestrian pursuant to subsection (1), it shall be an offence for the driver of any other vehicle approaching from the rear to overtake and pass the stopped vehicle.*
- *Where directional flow of traffic on a highway is divided into two separate roadways by a defined median, the driver of a motor vehicle shall yield the right of way to a pedestrian lawfully within a crosswalk or stopped facing the crosswalk on the half of the highway on which the vehicle is traveling.*
- *This Section shall not relieve the driver of a vehicle from the duty to exercise due care.*

Pedestrian Responsibilities

- *A pedestrian shall stop and not leave a curb or other place of safety and walk or run into the path of a vehicle that is so close that it is impracticable for the driver of the vehicle to yield.*
- *Every pedestrian crossing a roadway at any point other than within a crosswalk shall yield the right of way to vehicles upon the highway. Where a pedestrian is crossing a highway that has a pedestrian activated signal, the pedestrian shall ensure the signal is activated prior to crossing.*
- *This Section shall not relieve the pedestrian from the duty to exercise due care for their own safety.*

[2] The electronic version of the *Interim Report of the Crosswalk Safety Task Force Report* can be found at http://www.gov.ns.ca/tran/publications/InterimReportCrosswalkSafetyTaskForce.pdf .

INTRODUCTION

Crosswalk safety is every road user's responsibility. Improving crosswalk safety is a complex matter requiring consultation with road safety experts and resources from a diverse background. Travelling on a roadway is one of the most hazardous situations to be in, but most people feel safe in a vehicle or walking. There are more deaths from motor vehicle collisions than airplane crashes, terrorist attacks, and murders. There are a number of contributing factors in motor vehicle collisions. In most cases, the final factor is the pedestrian or driver's inability to rectify the situation. The objective of any road safety initiative is to identify and understand the factors that can lead to a collision, and determine the best method to mitigate these factors and ultimately prevent collisions from occurring. To do this, road safety practitioners examine road safety matters from three angles engineering, education, and enforcement.

Crosswalk safety is one component of road safety. The Task Force believes it is crucial for governments and road safety partners to remain current in their knowledge of road safety matters and best practices. The Task Force used the most current information available to develop this Report and its recommendations. It is essential that government and Nova Scotians thoroughly review this Report and seriously consider all of its findings and its recommendations.

In an effort to remain current and responsive to the challenges of crosswalk safety, the former Minister of Transportation and Public Works (TPW), Angus MacIsaac, and the Mayor of Halifax Regional Municipality (HRM), Peter Kelly, jointly appointed the Crosswalk Safety Task Force (Task Force) in April 2007. The objective of the Task Force was to identify strategies and measures to improve crosswalk safety.

Nova Scotians depend on the transportation system more than ever, and crosswalks are one piece of this complex system. The effects of technological developments in road safety have resulted in safer vehicles (such as air bags, anti-lock brake systems (ABS) and seatbelts) and yet more opportunities for driver distractions (such as isolation from the road, cellular phones, in-vehicle entertainment systems). Regardless, one factor remains the same; the driver and the pedestrian are human and prone to human error. Road safety "relies on the individual actions, behaviour, and needs of many different [people and] is invariably bound to result in some form of conflict and the role of human error has been well documented".[ii] The majority of road safety literature and research focused on implementing strategies to reduce the possibility of human error and prevent or reduce the severity of injury due to road collisions. Any effective road safety strategy must combine engineering, education, and enforcement. At the core of each of these approaches is the need to modify society's attitudes and behaviours. Focusing on a comprehensive approach the Task Force prepared this Report and its recommendations.[iii]

BACKGROUND

In 1990, the province and the former City of Halifax, released *The City of Halifax and Province of Nova Scotia Pedestrian Safety Task Force Report* (*Pedestrian Safety Task Force Report (1990)*), containing recommendations to improve crosswalk safety in Nova Scotia. The following is a brief synopsis of those recommendations.

ENGINEERING RECOMMENDATIONS:

- consider pedestrians as part of urban planning
- install crosswalks and pedestrian control devices with consistency and coordination among municipalities, and between municipalities and the province
- establish a mechanism for traffic authorities to meet on a regular and ongoing basis
- monitor and evaluate traffic control devices.

ENFORCEMENT RECOMMENDATIONS

- clarify the roles and responsibilities of the driver and the pedestrian in the Motor Vehicle Act (MVA)
- increase a police officer's abilities to enforce the MVA and the regulations towards motorists who have failed to yield to a pedestrian and pedestrians who have 'jaywalked'.[iv]

EDUCATIONAL RECOMMENDATIONS:

- evaluate curriculum requirements to support a comprehensive continuous safety education program for students
- media campaigns focused on pedestrian and crosswalk safety
- develop an ongoing comprehensive program that targets pedestrian safety for those 5-14, 15-24, and 55 and over; driver safety to those 15-34 and 55 and older
- coordinate and increase the role of safety education agencies.[v]

Since then, the province and the former City of Halifax have witnessed a number of changes with respect to transportation. Beyond the residual effects of growth and development of Nova Scotia and its municipalities (increased traffic volumes, speeds and speed limits, and urban sprawl), there were structural transformations within governments, departments, and organizations. These changes may have hindered the implementation of some of the recommendations from the 1990 task force, such as discontinuing the Safety Education Officer's (SEO) program, for a variety of reasons.

MUNICIPALITIES

In 1996, a number of municipalities within Nova Scotia amalgamated. These amalgamations affected the consistency in installation of crosswalk treatments, safety education, and law enforcement. An example of how amalgamation affected crosswalk safety is the amalgamation of the Cities of Dartmouth and Halifax, the Town of Bedford, and Halifax County to form Halifax Regional Municipality (HRM).

With the formation of HRM, the staff and resources dedicated to traffic and pedestrian related issues decreased compared to the cumulative totals of each of the previous jurisdictions. At amalgamation, the dedicated Police Traffic Services Division was disbanded and the absence of this Division has likely contributed to some of the poor driver and pedestrian behaviour and compliance that occurred in the municipality over the years. The standards and guidelines for traffic and pedestrian control devices, including By-laws, were inconsistent from one jurisdiction to the next. Although amalgamation had positive benefits, it has taken many years to establish consistent standards and the implementation of these standards is an ongoing process. Consistent implementation of pedestrian control devices applied with discretion and flexibility, based on engineering principles, proves to be in the best interest of public safety. Building the level of resources to handle the regional growth and the related traffic and pedestrian demands has been a struggle. The Police Integrated Traffic Services Unit (RCMP and Halifax Regional Police (HRP)) was reestablished in 2005. Despite this positive move, it should be noted that it is smaller than the cumulative resources pre-amalgamation.

PROVINCE

Provincially, the primary responsibilities for program development and service delivery related to road safety were divided between the Departments of Transportation and Infrastructure Renewal (TIR)[3] and Service Nova Scotia and Municipal Relations (SNSMR).[4] Additionally, as with most government programs in the mid 1990s, there were funding cutbacks that resulted in discontinued funding to TIR's traffic and pedestrian safety educational programs.

SAFETY EDUCATION DIVISION

Prior to 1995, one of the Registry of Motor Vehicles' mandates was to teach highway safety to road users, through the Safety Education Programs Division (SEP Division).

The SEP Division was made up of ten Safety Education Officers (SEOs) and two supervisors. These officers were based across the province. The SEOs' duties, with permission from the Department of Education and School Boards, were to teach elementary, junior, and senior high school students topics related to highway safety.

[3] In 1996, the Department of Transportation and Communications became the Department of Transportation and Public Works, and in October 2007, the Department of Transportation and Public Works became the Department of Infrastructure Renewal (TIR).
[4] Service Nova Scotia and Municipal Relations (SNSMR) were formerly the Department of Business and Consumer Services.

Some of the topics discussed in elementary schools were seatbelt use, winter, bicycle, school bus, pedestrian, and all terrain vehicle safety. Bicycle rodeos were also conducted at schools or in communities with service clubs to make sure the children knew how to operate a bicycle properly.

In junior high and high school, SEOs would include discussions on the above topics, as well as, information about obtaining a driver's license, drinking and driving, and any other highway safety topics the teacher(s) thought were important.

The main difference between high school and junior high was that high school students could participate in the Driver Education Program that included a driving and/or a defensive driving course. The SEOs would supervise the Driver Education Program administered by the School Boards. Teachers interested in teaching driver education in high schools across the province attended the Driver Training School in Amherst for two weeks in the summer to become licensed driver instructors.

The SEOs would sometimes visit childcare centres and would share tips on highway safety with the children.

The SEP Division was responsible to deliver the six hour defensive driving course, the professional driving course to school bus drivers and trucking firms and the "55 Alive" mature driving course to drivers over 54 years of age on behalf of the Nova Scotia Safety Council.

SEOs also held information sessions on highway related topics for other groups. For example with the proclamation of seat belt legislation, the responsibility of promoting the benefits of the law fell to SEOs. Any new government road initiative in relation to road users was given to the SEOs to advise and explain the new laws to the public.

In 1995, the government discontinued the Safety Education Programs Division. The province never evaluated the safety education program to assess and determine if it was successful in fulfilling its objectives.

Road Safety Advisory Committee (RSAC)

In 1997, the former Department of Transportation and Public Works, established the Road Safety Advisory Committee (RSAC). RSAC is responsible for advising government on road safety matters. RSAC represents both public and private members and organizations that have an interest and expertise in road safety.[5] Currently, the Departments of Transportation and Infrastructure Renewal, Service Nova Scotia and Municipal Relations, Justice, and Health Promotion and Protection (HPP) actively participate in RSAC to explore a number of road safety matters and initiatives. The Report refers to these four departments as the RSAC member departments.

[5] RSAC advises the Departments of Transportation and Infrastructure Renewal (TIR), Service Nova Scotia and Municipal Relations (SNSMR), Health Promotion and Protection (HPP), and Justice (DOJ) on road safety challenges.

RSAC's work is concentrated in four general areas:

- alcohol countermeasures and traffic enforcement,
- vehicle occupant safety (i.e. seat belts and child safety seats),
- social marketing (public awareness campaigns)
- vulnerable road users (pedestrians, cyclists, and motorcyclists).

RSAC explores many road safety issues, and examines ways to make Nova Scotia's highways safer. Pedestrian safety is usually a matter for RSAC to address. However, occasionally government, or RSAC, may establish a working group to examine a particular road safety matter; and this Task Force is an example.

The Task Force structure was designed to have representation from key stakeholders and individuals with expertise in the core areas of education, engineering, and enforcement.[6] The Minister of TIR and the Mayor of HRM understand that countermeasures for preventing and minimizing the number of crosswalk collisions require knowledge and expertise in engineering, enforcement, and education. The Task Force believes crosswalk safety is a responsibility that expands across government departments, road safety organizations, police agencies, and municipalities. To increase crosswalk safety a multi-disciplinary and collaborative approach is utilized, taking advantage of the broad range of expertise that a Task Force provides.

In January 2007, the Halifax Chamber of Commerce held an awareness forum on crosswalk safety and published a report entitled *Crosswalk Safety & Awareness Forum: Changing Behaviour -- Saving Lives* (*Crosswalk Forum Report (2007)*). The Task Force compared the *Crosswalk Forum Report* and its recommendations to that of the *Pedestrian Safety Report (1990)*. There are many similarities between the reports and their recommendations.

ENGINEERING RECOMMENDATIONS

- consistency and collaboration in highway designs (*Pedestrian Safety Task Force Report (1990)*)
- engineering installations must be in accordance with the Transportation Association of Canada (TAC) standards.[vi] (*Crosswalk Forum Report (2007)*)

ENFORCEMENT RECOMMENDATION

- make speed enforcement a priority (*Crosswalk Forum Report (2007)*)

[6] To review the biographies of the Task Force Members, see Appendix B of this Report.

EDUCATION RECOMMENDATION

- develop a comprehensive pedestrian education program that would be taught within the school system from primary to grade 12. (*Crosswalk Forum Report (2007)*)

The Task Force recognizes the importance of the previous recommendations and the contributions of the previous task force and Crosswalk Forum. To that end, this Report and its Recommendations incorporates many of the recommendations advanced in the two previous reports.

The *Pedestrian Safety Task Force Report (1990)* and the *Crosswalk Forum Report (2007)* demonstrates that enhancing crosswalk safety cannot occur in isolation. Road safety in general significantly affects crosswalk safety. Other road safety matters such as speeding, impaired driving, and distracted driving often are contributing factors to most crosswalk collisions. The Task Force believes crosswalk safety in Nova Scotia can only improve when examined within the broader context of road safety.

NATIONAL

Canada's collision rates climbed during the 1990s - ending up with one of the highest collision rates among the industrialized nations. Concerned with this trend, national departments, agencies, and organizations and provincial governments became involved in attempting to curb this increase. In 2000, the Canadian Council of Motor Transport Administrators (CCMTA)[7], Transport Canada, provincial governments, and other road safety stakeholders convened and agreed to develop targets for reducing road collisions outlined in, "Road Safety Vision 2010" (RSV 2010). RSV 2010 identified key areas of concern and developed reduction targets for each that were to be achieved by 2010.

> "Pedestrian crashes are complex events that vary widely in terms of the age of the pedestrians involved and associated crash circumstances"
>
> *R. Retting — American Journal of Public Health*

[7] "The origins of the Canadian Council of Motor Transport Administrators (CCMTA) [can be] traced back to 1940, when the four Western provinces met to consider issues of common interest relating to road transport. In the early fifties, the group was joined by Ontario and the Yukon Territory. The Canada-wide expansion of the organization took place in 1956, some two years after the enactment of the Motor Vehicle Transportation of Parliament, in response to an already felt need for uniformity due to increasing movement and traffic." CCMTA, *A Look at CCMTA*. (Online : www.ccmta.ca, 2006) : Accessed September 2007.

RSV 2010 objectives were to:

- *raise public awareness of road safety issues*
- *improve communication, cooperation, and collaboration among road safety agencies,*
- *enhance enforcement measures,*
- *improve national road safety data quality and collection.*[vii]

In response, provincial governments developed programs and strategies to achieve these targets and reduce the number of serious and fatal collisions. In developing these programs, it became evident that traditional approaches used to address road safety matters were not going to work because attitudes of road users had changed, government structures were re-designed, and road safety technology had advanced. A new philosophical approach for addressing road safety issues was required.

Governments now recognize that each contributing factor and collision is unique and no single intervention will address all situations. Effectively understanding and addressing any road safety matter requires a multi-disciplinary and collaborative approach. Crosswalk safety is especially complex because of the diverse populations involved and the various levels of driver and pedestrian safety knowledge and experience.[viii]

CURRENT SITUATION

ROAD SAFETY IN NOVA SCOTIA

The establishment of RSAC enabled the government of Nova Scotia to use a comprehensive multi-disciplinary approach to work towards a reduction in the number of motor vehicle collision fatalities and serious injuries. These initiatives included improvements in highway infrastructure, programs to encourage safer driving behaviours, enhancements in transportation related legislation (e.g. child safety restraints, seatbelt use, Graduated Drivers Licensing (GDL), and impaired driving laws), and advancements in the emergency response and trauma system.[ix] Despite this progress, there is still room for improvement, as the annual number of motor vehicle collision fatalities and serious injuries in Nova Scotia appears to have reached a plateau.

Road safety is a concern, as motor vehicle collisions are a leading cause of fatalities and serious injuries among Nova Scotians under the age of 45. The national and provincial total cost of road safety traumas is approximately 3% of Gross Domestic Product per year. According to a 2003 report, on the economic burden of unintentional injuries, collisions in Nova Scotia cost citizens $74 million annually due to direct health expenditures and accumulated loss of productivity. Without addressing the most serious road safety concerns, Nova Scotia's capacity to establish and maintain its economic sustainability is threatened.[x]

The work of RSAC and RSAC member departments identified impaired driving as the leading cause of motor vehicle collision fatalities and serious injuries. Additionally, the research conducted by these bodies has identified speed and driver distractions to be second and third causes of collisions in the province respectively. Alcohol impaired driving, speeding, and driver distractions all contribute to reducing crosswalk safety. Effectively addressing crosswalk safety requires a larger road safety strategy that is comprehensive, multi-disciplinary, and evidence-based. The goal of a road safety strategy would consist of engineering, education, and enforcement measures to improve overall road safety.

Recently, CCMTA released its *Road Safety Vision 2010 Mid-Term Review Report* (*Mid-Term Review Report*). The report discussed Canada's progress towards achieving the RSV 2010 targets. It stated that the results were disappointing, yet identified that Nova Scotia was performing better overall compared to most other provinces. For 2005, Nova Scotia's motor vehicle collision fatality rate per 100,000 population was 7.7, lower than all but two jurisdictions: Ontario and the Northwest Territories/Nunavut, and is better than the national average.[xi] The *Mid-Term Review Report* commended Nova Scotia for their use of RSAC to coordinate road safety initiatives. However, in

order to continue to make progress the province will have to consider revising its approaches to road safety.

The *Mid-Term Review Report* identified road safety matters that require multi-disciplinary targeted strategies; including impaired driving, speeding, and driver distraction. The *Mid-Term Review Report* also stressed the need for provinces to develop a road safety strategy that addresses road safety matters using a comprehensive approach. The Task Force acknowledges the need for a comprehensive road safety strategy that uses evidence-based best practices and is interdisciplinary. The development of such a strategy would address the challenges of speeding, drinking and driving, and driver distraction in a comprehensive manner. The following sections will outline the effects of speeding, drinking and driving, and driver distraction on crosswalk safety.[xii]

SPEEDING

The consequences of a pedestrian collision depend on a number of factors, some of which include age and health of the pedestrian, and the speed of the vehicle.

While the age and health of pedestrians are variables that are impossible or difficult to modify, speed, as a behaviour, can be modified through education, engineering, and enforcement measures.

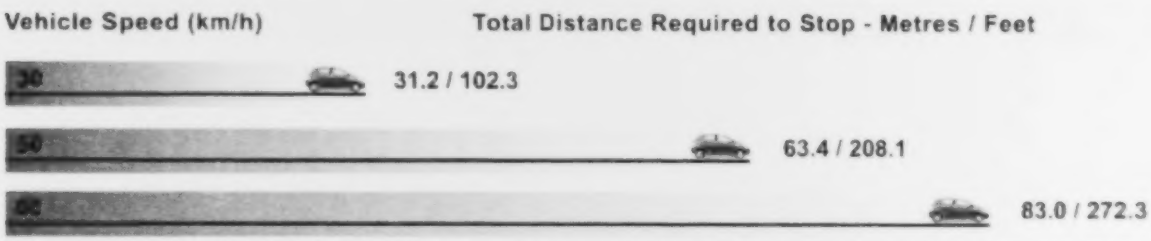
A number of studies have examined the effect of speed on the severity of pedestrian injury. There is no doubt that the faster the vehicle is traveling, the more severe the effects on the pedestrian's body.

For example studies have shown:

- If a car hits a pedestrian at 60 km/h, there is a 93 percent chance that the pedestrian will be killed.[xiii]
- At 50 km/h the chance of death is reduced to about 73 per cent, and at 30 km/h the pedestrian has a 95 per cent chance of survival.[xiv]
- A detailed study of pedestrian deaths in Adelaide, Australia, found that 32 per cent of those who died would probably have survived had the vehicle that hit them been traveling 5 km/h slower, and one in ten would not have been hit at all.[xv]
- Australian research suggests that a uniform reduction in travel speed of 10 km/h in 60 km/h zones would halve the number of pedestrian fatalities and eliminate the collision in around one-quarter of cases.[xvi]

The following depicts the possible effects of speeding on stopping distance:

Figure 1: Vehicle Speed & Stopping Distances



ENFORCEMENT OF SPEEDING LAWS CAN HAVE A SIGNIFICANT EFFECT ON PEDESTRIAN COLLISIONS

In Nova Scotia, many drivers now travel at speeds over the posted speed limit.

In many jurisdictions, the enforced speed level is somewhat higher than the posted speed limit. This has two effects. First, a number of people who travel at speeds marginally over the posted speed limit are not stopped. Second, this tolerance reinforces the perception that speeding is not considered a serious offence. With the result, that many drivers routinely travel at speeds over the posted limit. Drivers do not consider the potential life altering nature of this behaviour.

> "When did the maximum become the minimum?"
>
> *Task Force Member*

There are a number of reasons why speed limits are not enforced absolutely. The exact measurement of speed may be open to dispute. Police compensate for likely challenges to violations by allowing for speedometer error and inaccuracies in the speed measurement equipment. Finally, as well as maximizing the likelihood that police evidence will stand up in court, this practice also promotes good will because enforcement efforts target high-risk speed offenders.

It has been argued that enforcement at speeds greater than the posted speed limit undermine the credibility of speed limits, because the speed limit becomes artificially inflated as the general public becomes aware of the enforcement level. The enforcement of posted speed limits through issuing Summary Offence Tickets (SOT) deters speeding and lowers the public's acceptance of speeding. Speeding then would be considered a socially unacceptable behaviour resulting in changed driver behaviour. Without a method for deterring speeding, drivers will travel at the "accepted" speed (speed limit plus tolerance level) rather than the speed limit, increasing the potential for motor vehicle and pedestrian collisions. In this scenario the maximum speed becomes the minimum speed.[xvii]

Adopting lower ticketing levels has been shown to reduce the level of speeding behaviour and may lead to greater public acceptance and credibility of posted speed limits.

An applicable case study comes from Australia. In 2001, the general urban speed limit was reduced from 60km/h to 50 km/h. In conjunction with the change in law, special efforts were used (in some locations) to reduce the overall average speed of drivers in all speed zones. The City of Melbourne implemented the "Arrive Alive" program, of which speed enforcement was a significant component.[xviii]

The consequences of speed and crosswalk safety are severe. The Task Force believes that the credibility of posted speed limits needs to be restored. It is evident that reducing incidents of speeding must be made a priority in Nova Scotia. Nova Scotians must accept that the speed limits posted are specific to the roadway and crosswalk designs and be made aware of the risks of not complying.[xix]

ALCOHOL IMPAIRED DRIVING

Drinking and driving remains a road safety challenge in spite of the numerous public awareness campaigns, legislative and program changes, and enforcement strategies. Nationally, the number of motor vehicle collision fatalities involving impaired drivers has decreased since the 1990s. However, alcohol continues to be a factor in a number of motor vehicle collisions and fatalities. The Traffic Injury Research Foundation (TIRF) states the number of alcohol related motor vehicle collision fatalities remains high.[xx] Approximately 30% of all Canadian collision fatalities involve alcohol.[xxi] The results of the *Mid-Term Review Report* suggest that Canada cannot achieve the original targets for reducing drinking and driving related collisions.[xxii]

The underlying reality is that despite these significant efforts to reduce the incidents of impaired driving it remains a concern as it has significant impacts on road safety. This is even more of a concern given the "rising rate of alcohol consumption and high risk drinking in Canada," and Nova Scotia. The rise in alcohol consumption will undoubtedly contribute to an increase in the incidents of alcohol impaired driving. It is essential that departments responsible for public health and road safety develop and implement effective polices and prevention programs to reduce impaired driving.[xxiii]

There is also evidence to suggest that impaired pedestrians are also an issue in some jurisdictions[xxiv] however, Nova Scotian research is inconclusive. The *Mid-Term Review Report* identified this as an issue stating, "Impaired pedestrian issues need to be further researched and appropriate interventions developed".[xxv]

The Department of Health Promotion and Protection recently released a report entitled *Changing the Culture of Alcohol Use in Nova Scotia: An Alcohol Strategy to Prevent and Reduce the Burden of Alcohol Related Harm in Nova Scotia* (Nova Scotia's Alcohol Strategy). This report identifies the negative impact that alcohol misuse has on Nova Scotians' health and safety and recommends that the Department of Transportation and Infrastructure Renewal continue its efforts to develop countermeasures to reduce impaired driving.[xxvi]

In a report completed by Monash University Accident Research Centre (Monash Report), the authors noted that drinking and driving was especially a concern in rural parts of Victoria, Australia. The Task Force believes that this study may be applicable to Nova Scotia given the rural nature of the province. The Monash Report stated that drinking and driving led to the "increased use of back roads during enforcement activity ... represent a significant problem in rural areas. It is some interest to note, though, that the use of alternative routes may not only occur in rural areas... [it was once] noted that one consequence of the 1983 RBT [random breath tests] in Melbourne was an increase in single-vehicle [collisions] in residential streets on the weekends".[xxvii] In a survey Monash conducted, respondents reported they "were more likely to ... us[e] alternative routes or backroads, driv[e] faster, and leav[e]... later to avoid being stopped."[xxviii] This type of behaviour may lead to pedestrian collisions and demonstrate why it is important to target problem driver behaviours as they contribute to reducing crosswalk safety.[xxix]

Therefore, the Task Force recommends:

1. ROAD SAFETY ADVISORY COMMITTEE (RSAC) MUST SUPPORT THE DEPARTMENT OF HEALTH PROMOTION AND PROTECTION'S (HPP) ALCOHOL STRATEGY BY DEDICATING A MEMBER TO ASSIST WITH THE DEVELOPMENT AND IMPLEMENTATION OF AN ALCOHOL IMPAIRED DRIVING STRATEGY.

DRIVER DISTRACTION

Driver distraction is one of the growing concerns in road safety. Studies demonstrate that driver distractions increase the risk of collisions. While, there have always been behaviours inside vehicles that distract drivers, the growing proliferation of electronic devices, both personal and part of vehicle design, provide more opportunities for driver inattention.

> "Many drivers today tend to view driving... as a simple everyday task that requires minimal attention."
>
> *Ontario, Ministry of Transportation, Smart Drivers Just Drive*

There is little doubt that drivers and pedestrians are susceptible to distraction and this threatens crosswalk safety. Addressing the issue of distraction, particularly driver distraction, will likely

improve crosswalk safety, in the same way that addressing the issue of speed and impaired driving will improve the crosswalk environment.[xxx]

The lack of a common definition for driver distraction makes it difficult to address, but not impossible. In general, studies define it as anything that takes the driver's mind away from the task of driving. [xxxi] When thinking of driver distraction, cellular phones are often blamed. This is only one cause of driver distractions and a contributing factor in pedestrian collisions. In addition, drivers today not only use cellular phones, but routinely use portable music players, and hand-held devices for wireless e-mail, internet and text messaging - all of which increase risk. However, cellular phones and electronic devices are not the only distractions - ***any*** activity that makes the driver look away from the road, move within their seat, or takes their mind away from the task of driving is a distraction.[xxxii] By this general definition, distraction also includes eating and drinking, reaching behind the seat, reading, and changing the radio station or CD player. Drivers are not the only ones confronted with more distractions, pedestrians are using similar portable technologies, with similar results - less attention to the task.

The objective of addressing driver distraction is not to prevent drivers from doing all of these activities but to make them more aware of the important task of driving. Drivers and pedestrians, in the case of crosswalk safety, regard driving and walking as routine tasks that do not require a high level of skill and attention. This is in part due to the types of vehicles that are available today. These vehicles place the driver in an environment of their own, detaching them from the activities and obstacles around them. This sense of detachment is similar for pedestrians who are engaged in conversations on their cellular phones or listening to their music. Combine this sense of detachment with pedestrians at crosswalks and it becomes more of a concern. In this situation, there are two parties that are potentially not paying attention, hindering their ability to react quickly and safely.[xxxiii]

> "After years of improving the quality of our road environment and the safety of the vehicles we driver, road collisions are still reported on a daily basis... Human error attributes to the vast majority (95%) of these accidents... Drivers and others need to approach their use of the roads in a different way."
>
> *Strategic Guidance for Road Safety Professionals*

Driver distraction delays reaction times so it takes longer to acknowledge the threat and respond appropriately. The response is not always the safest choice and may lead to more severe consequences. In a study conducted in 2002, researchers found that drivers who were distracted responded an average of four seconds later than drivers who were not distracted. Distracted drivers affect all road users, because their driving appears erratic or irrational and can lead to aggressive driving.[xxxiv] Most studies involving distraction and road safety focus on the driver, but

during the Task Force meetings, members expressed their concern for pedestrians distracted by cell phones and other personal electronic devices. Distraction of either the driver or the pedestrian can result in a crosswalk collision. Therefore, it is important to address the matter of distraction, as it would improve crosswalk safety.

ROAD SAFETY SUMMARY

Motor vehicle collision are a serious concern, and it is the one area of major injury in Nova Scotia that still lacks a comprehensive strategy to address the issue – both suicide and falls among older adults have comprehensive strategies in place or in development. Road safety needs the same thing.[xxxv]

As road users, we have to acknowledge that the driver behind the wheel or the pedestrian crossing the road may be inexperienced, intoxicated, or distracted. Thus we all must take due care and respect the rules of the road.[xxxvi]

Crosswalk and pedestrian safety is one aspect of road safety. Of the total number of motor vehicle collisions in Nova Scotia, pedestrian collisions, comprise a small portion. For example in 2005, pedestrian collisions represented only 1.2% of all collisions reported.[8] Although pedestrian collisions represent a small portion of motor vehicle collisions, the potential outcomes are no less tragic than other collisions. There are multiple factors that compromise road safety and impact pedestrian and crosswalk safety and the Task Force strongly believes that addressing the larger issue of road safety will benefit crosswalk safety.

[8] The total number of collisions (property damage, injury, and fatalities) for 2005, was 29,090, of those 350 were pedestrian collisions.

NOVA SCOTIAN PEDESTRIAN COLLISION STATISTICS

The Task Force reviewed the province's pedestrian collision statistics to assess and determine to what degree crosswalk safety is an issue. The following is an analysis and subsequent discussion of pedestrian collision statistics.

> "It is difficult to base the identification of intersection safety problems solely on pedestrian or bicyclist crashes... [as they] are very random."
>
> U.S. Department of Transportation

The Manager of Research and Analysis of TIR conducted the statistical analysis on behalf of the Task Force. TIR Road Safety provided the pedestrian collision statistics from TIR's "Production Database". The provincial Department of Finance provided the population statistics and SNSMR provided the driver licensing figures.

It is important to consider that the use of collision statistics by TIR or HRM is only one factor in determining safety issues with respect to a location. The frequency of pedestrian collisions:

> *are so sparse that only one or two per year may cause an intersection [or location] to be considered a 'problem' or 'high-crash' location. Thus, even using multiple years of data per site, it is difficult to base the identification of intersection safety problems solely on pedestrian or bicyclist [collisions]. Furthermore, bicycle and pedestrian [collisions] are very random and a location with a high pedestrian or [bicycle collision] potential may have zero [collisions] for several years.*[xxxvii]

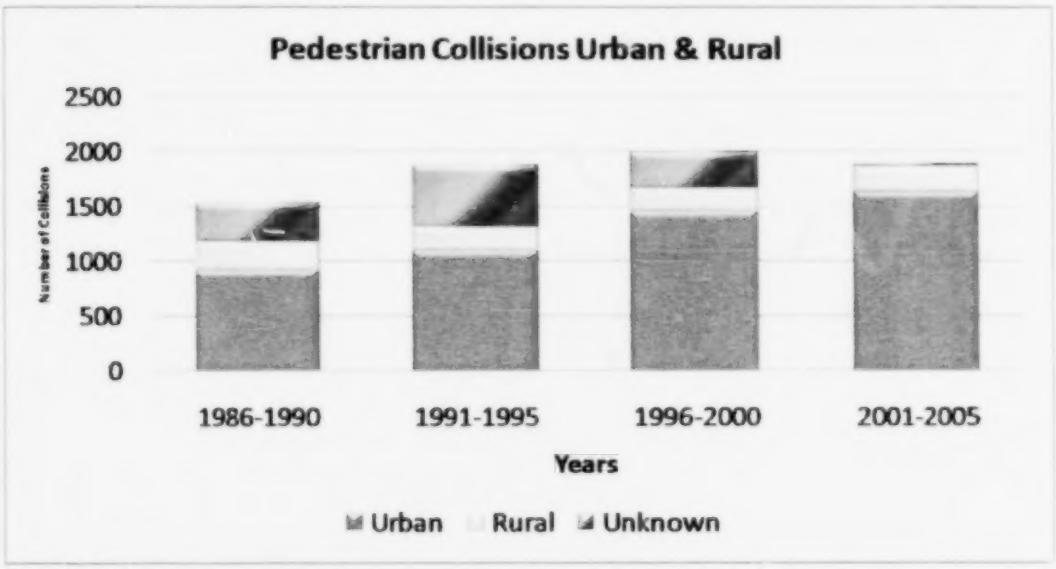
The statistical analysis conducted for this report appeared to identify some trends that must be taken into consideration when developing pedestrian-specific engineering, education, enforcement, strategies and evaluation frameworks.

The information that makes up the Production Database collision statistics comes from reports completed by law enforcement officers at the scene, or reports filled out by pedestrians and/or drivers at the police station. Law enforcement officers will attend the scene of a pedestrian collision when called by a witness or a person involved in the collision. The report contains evidence obtained at the scene from speaking with the persons involved or witnesses. Law enforcement officers may not attend to a collision if they are not called to the scene or if they are unable to attend, or attend immediately, due to other collisions or situations. In these instances it is up to the persons involved to go to a police station to complete the report(s).

The complex nature of collisions makes it difficult to complete pedestrian collision reports accurately in every instance. The reliability of information provided by the pedestrian, driver, and witness is highly influenced by a number of factors. "[P]erception, attention, and understanding, including the stress or shock of an event or a person's expectations of what will happen, may influence what information is encoded in memory and how well it is encoded."[xxxviii] The volume of traffic collision reports received also affects the ability for others (fellow law enforcement officers

or administration) to review every report to ensure it is complete. The result is data that may not be completely valid and reliable making it difficult to make decisions primarily based on collision statistics. Figure 2 demonstrates the pedestrian collision rates for rural and urban Nova Scotia is an example of the need for reliable data.

Figure 2 Pedestrian Collisions by Urban & Rural Locations (1986-2005)



At first glance, it appears there was an increase in the number of pedestrian collisions in urban Nova Scotia when comparing 2001-2005 to 1986-1990. However, the number of collisions categorized as "unknown" location is decreasing. The decrease in the number of collisions reported as location "unknown" demonstrates how improved reporting affects statistics and the need for accurate data.

It is necessary to view the following statistical analyses with the above discussion in mind. TIR and the SNSMR has made great strides in improving the methods of data collection and retention in a variety of ways. The reporting forms are now more comprehensive and clearer to complete. This will expedite the reporting process as well as the transfer of data into the Production Database. A more user-friendly system will replace the Production Database, making the collection and extraction of data more accurate and timely. Proactively addressing emerging road safety matters, including pedestrian and crosswalk safety, requires timely, accurate, and reliable information.[9]

[9] For a discussion about data collection, its uses, and importance, see "The Role of Evaluation in Crosswalk Safety" of this Report pages 75-77.

The statistical analysis includes a comparison between the years 1986 to 2006. For the purposes of this Report the following areas were analyzed:

- Overall pedestrian collision rates
- Pedestrian fatalities from collisions
- Collisions by site and vehicle manoeuvre
- Pedestrian collisions by conditions
- Pedestrian collision rates by driver gender and age
- Pedestrian collisions by pedestrian age
- Pedestrian collisions by pedestrian action

The following graph demonstrates the rates of pedestrian collisions per 100,000 population between the years 1986-2006. It is important to note that all types of pedestrian collisions are included in this graph such as walking along side of the road and lying on the road. They also include minor collisions, serious collisions, and fatalities.

Figure 3 Pedestrian Collisions/ 100,000 Population (1986-2006)

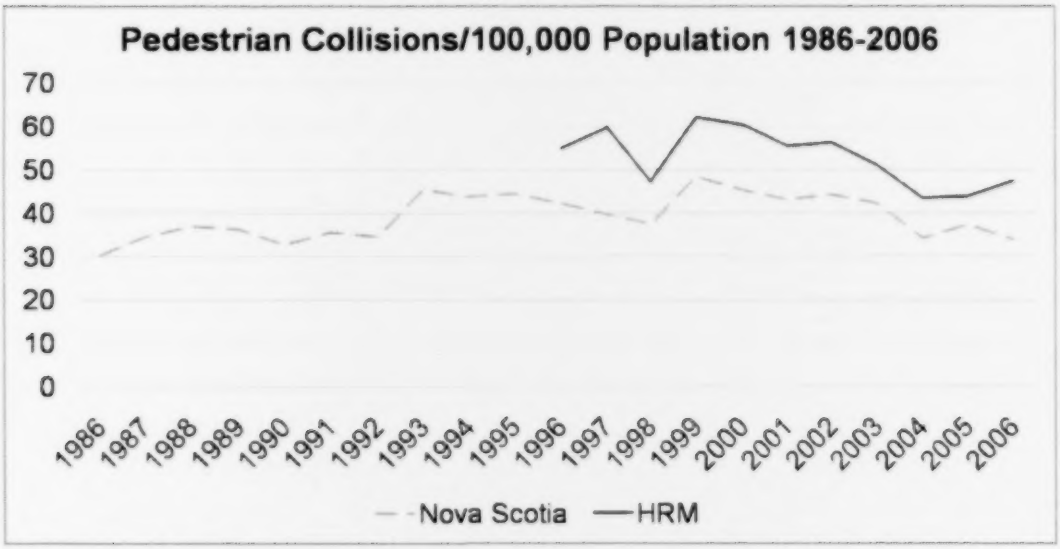


Figure 3 illustrates the collision rates for the province and HRM. As discussed in the "Background" section, HRM has undergone a series of changes since amalgamation in 1996. The data included is from HRM only, statistics prior to 1996, were for the City of Halifax and do not reflect the same population base. The pedestrian collision rate pattern for HRM mirrors that of the province. Considering HRM represents about 50% of all pedestrian collisions and 40% of the population (2005 population), this is not surprising.

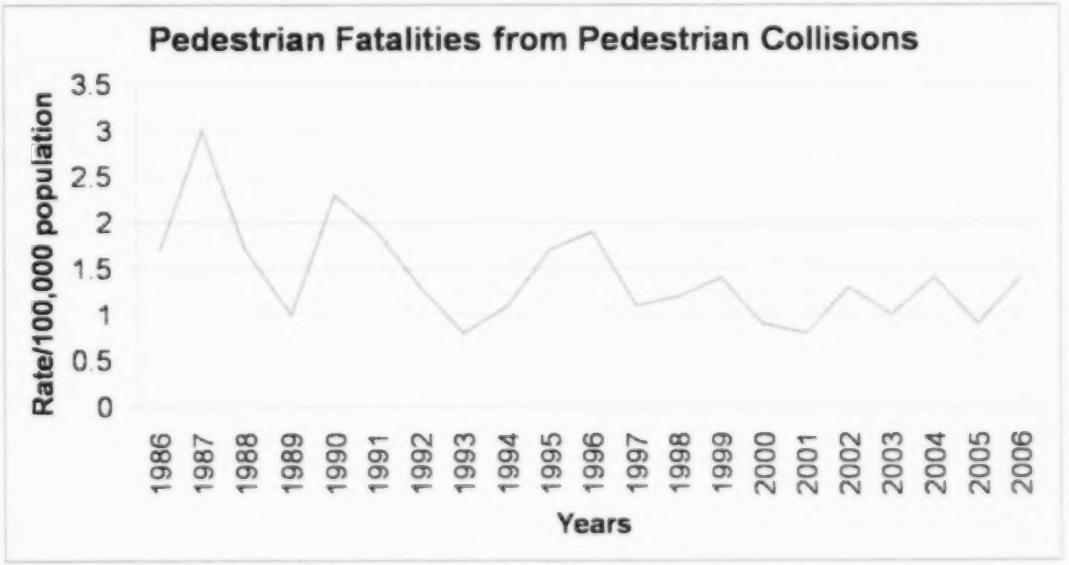
In 2005, pedestrian collisions represented only 1.2% of all collisions reported. Pedestrian collisions rates between 1986 and 1999 increased, but since 1999, the rates of collisions decreased.

Since 1999, within HRM the rates of pedestrian collisions and fatalities have decreased. It is unknown exactly what has caused the decreases as HRM has witnessed a number of changes from engineering, education, and enforcement perspectives. These changes likely contributed to the provincial decreasing trend.

With the amalgamation of the Cities of Halifax and Dartmouth, the Town of Bedford, and Halifax County in 1996, the standards for evaluating, implementing, upgrading and maintaining traffic and pedestrian control devices were put in place primarily for the HRM Core Area. The determination of all these control devices on HRM owned roadways are under the jurisdiction of the Traffic Authority for the municipality. The design and application of control devices is applied in conjunction with sound engineering judgment supported by the guidelines and standards provided in *Manual of Uniform Traffic Control Devices for Canada (MUTCDC)*. Consistent implementation applied with discretion and flexibility based on engineering principles proves to be in the best interest of public safety.

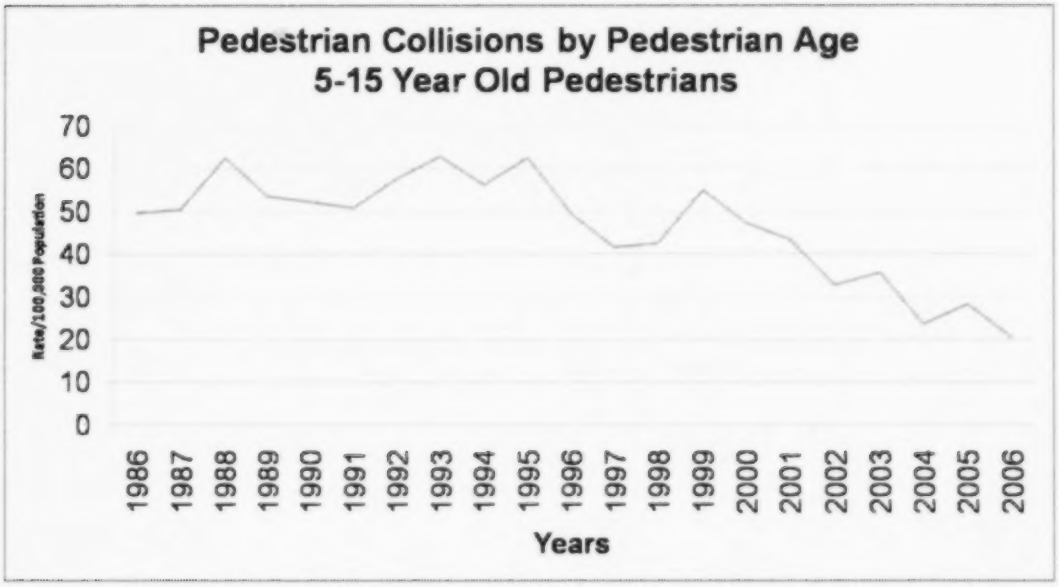
The number of pedestrian collision fatalities have also decreased, the highest number of pedestrian fatalities was in 1987 (27) and the lowest was in 2001 (7). It is important to note the increase in survival rates for pedestrian collision may be due, in part, to advances in road safety and trauma care.[xxxix] The fluctuation in rates demonstrates the importance of having timely data to identify trends.

Figure 4 Pedestrian Fatalities from Pedestrian Collisions (1986-2006)



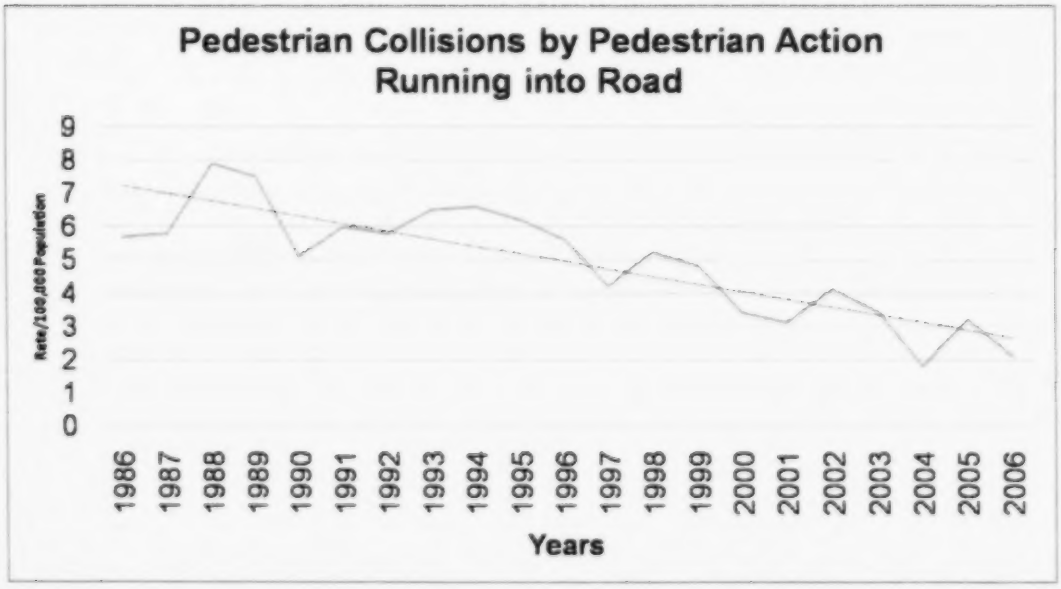
Since 1999, the decrease in the rate of pedestrian collisions is most evident with child pedestrians aged 5-15. As the following graph "Pedestrian Collisions by Pedestrian Age: 5-15 Year Old" demonstrates the decreasing trend in the rate of collisions.

Figure 5 Pedestrian Collisions by Pedestrian Age: 5-15 (1986-2006)



The number one action for this age group is running into the road, representing 21.9% of pedestrian collisions. Overall the collision rates for this pedestrian action has decreased substantially from 1986-2006; it is likely that decrease in collision rates for pedestrians 5-15 affected this trend.

Figure 6 Pedestrian Collisions by Pedestrian Action -- Running into Road (1986-2005)



The two graphs on their own imply improvements in pedestrian safety are a reason for decreases in collisions for children aged 5-15. Improvements only partly explain the decline in child involvement in pedestrian collisions. A review of the research on causes for childhood injuries and death suggests inactivity could be a large contributor to the decrease in child involvement in pedestrian collisions. The Safe Kids Canada[xl] report *Child and Youth Unintentional Injury*, identified the leading causes of injury related death for children aged 0-14 were:

- motor vehicle collisions
- drowning, and
- threats to breathing (e.g. suffocation, choking, and strangulation)[xli]

Particular to pedestrian safety, Safe Kids Canada stated that the greatest *"decline in combined death and hospitalization rates [were] for pedestrian injuries"*[xlii]. A number of sources have speculated the main reason for the decrease is the inactivity of children who are walking less, among other activities, than the previous generation.[xliii]

In 2005, Dalhousie University conducted a survey on behalf of the Departments of Health Promotion and Protection and Education. Dalhousie published the results of the study in a report entitled *PACY 2005: Physical Activity Levels and Dietary Intake of Children and Youth in the Province of Nova Scotia – 2005*. The study focused on children in grades three, seven, and eleven. Among many questions asked of children and parents/guardians, was the method of transportation used to and from school in various weather conditions. The authors of the report compared the results of their 2001 survey, with their 2005 survey.

The following is an adaptation of the table contained in the report:

Table 1: Comparison of transportation modes used by children to get to school 2001 & 2005[xliv]

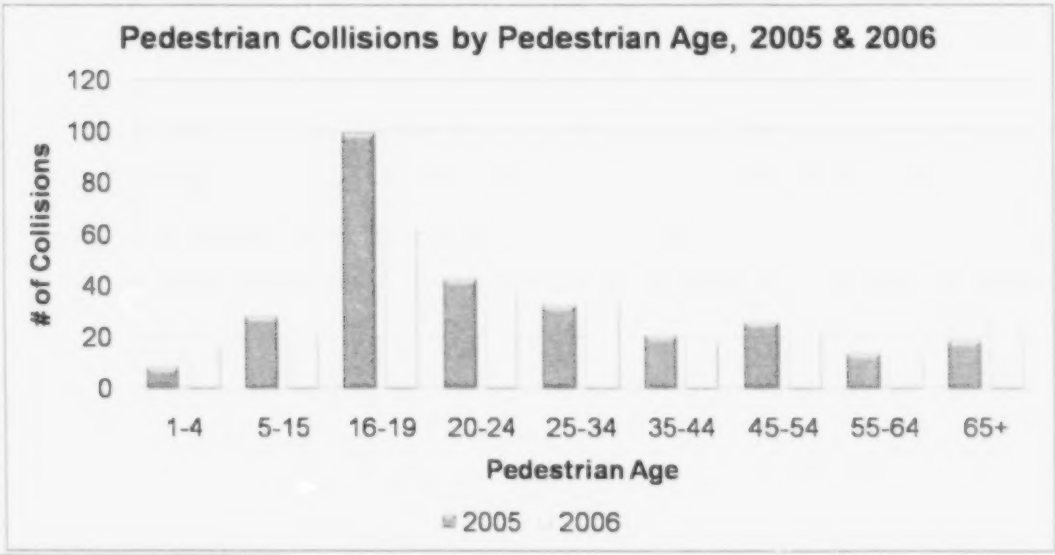
Transportation to school in good weather	Grade 3		Grade 7		Grade 11	
	2001	2005	2001	2005	2001	2005
Take the bus	58.2% (329)	65.5% (537)	70.9% (395)	59.5% (484)	57.6% (300)	52.9% (393)
Walk	25% (141)	15.4% (126)	18.5% (103)	20% (163)	18.8% (98)	15.2% (113)
Driven by someone	14.7% (83)	14.8% (121)	8.1% (45)	12.1% (98)	18.6% (97)	16.0% (119)
Bike	2.1% (12)	0.1% (1)	1.8% (10)	0.9% (7)	1.3% (7)	0.7% (5)
Drive themselves	N/A	N/A	N/A	N/A	3.6% (19)	6.9% (51)

As is demonstrated in Table 1, there was a general decline in the percentage of students walking to and from school. In the four-year period (2001-2005), the percentage of children walking to school dropped 10 percentage points, for children in grade three; increased two percentage points, in grade seven, and decreased about three percentage points, in grade eleven.[xliv] As children age, the modes of transportation available increases and children may choose to bicycle, rollerblade, or drive to school instead of walking. What is significant about the survey results is that the largest decrease in walking to school is with the younger children. This suggests these children may be less active and are not only a health concern;[xlvi] but a crosswalk safety concern. Inactive children are less experienced than active children. The Task Force believes inexperienced child pedestrians, who have fewer opportunities to practice supervised crosswalk safety, have a greater risk of being involved in a collision at an early age, as well as later in life.

Inactivity levels do not entirely lead to inexperience; where a child resides is also a factor. As expected, children who grow up in a primarily urban environment will have honed a different set of pedestrian safety skills than children raised in rural areas.[10]

Child pedestrians are at a high risk for being involved in collisions and keeping them from walking does not keep them safe. Inactive children are not necessarily safer children; and in fact their inactivity may serve to prolong their inexperience and their risk for their involvement in pedestrian collisions later in life as is suggested with the high pedestrian collision rates for youth aged 16-19.[xlvii] The rates of pedestrian collisions for young adults aged 16-19 are higher than other age groups. The following two graphs and discussion demonstrate their involvement in pedestrian collisions.

Figure 7 Pedestrian Collisions by Pedestrian Age (2005 & 2006)



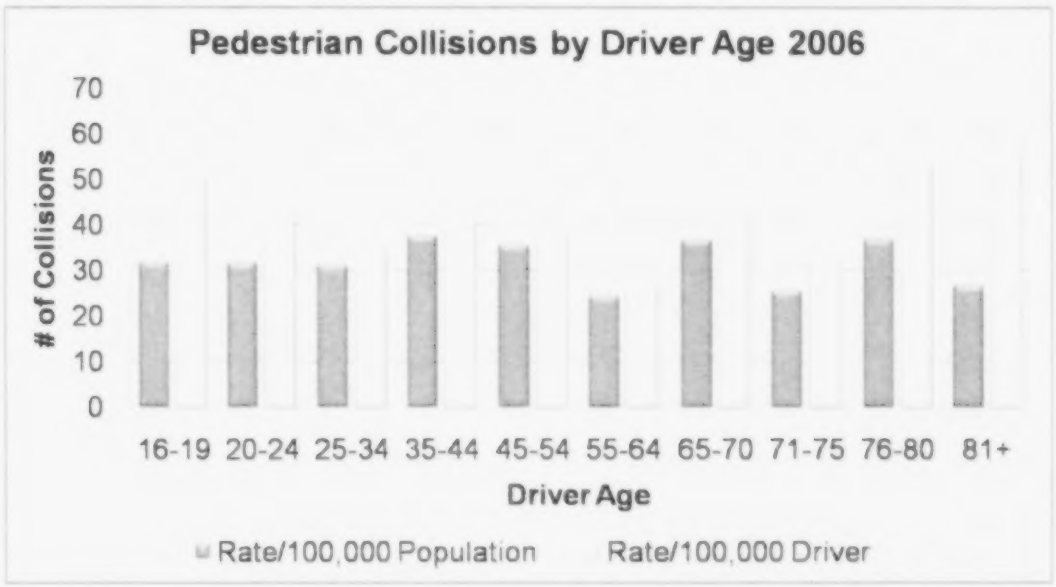
[10] For a discussion about the level of supervision a child requires and its effects on crosswalk safety see "The Role of Education in Crosswalk Safety" of this Report pages 51-61.

As is demonstrated in Figure 7, pedestrians aged 16-19, have the highest rates of pedestrian collisions. Research and Task Force discussions identified a number of possible reasons for this, but limited evidence prevents definitive conclusions.

One possible reason for increased collisions identified is this age group are more apt to engage in risky behaviour without taking the necessary safety precautions. Risky behaviours combined with inexperience as pedestrians – due to the lack of opportunities to develop pedestrian safety skills earlier in life-- may explain the increase in adolescent involvement in pedestrian collisions as a driver and a pedestrian.[xlviii] While there is no information specific to Nova Scotia, Australian pedestrian information suggests that this age group may require more time to learn the pedestrian skills required for safely navigating complex traffic situations. It also suggests because adolescents may tend to walk alone or with peers more often than other age groups, adolescents may feel "over confident". Over confidence may contribute to risk taking behaviours and reinforce poor pedestrian behaviours. Furthermore, adolescents aged 16-19, are likely to be involved in increasingly complex crossing situations, possibly increasing their chances for involvement in pedestrian collisions.[xlix]

Australian information also states that adolescents tend to be involved in pedestrian collisions: "during the day, with the ... highest [rates] during morning and afternoon peak periods. This is generally associated with trips to and from school and playing after school. Running when crossing roads, paying insufficient attention and careless crossing of roads are prominent factors"[l] in child and youth pedestrian collisions.

Figure 8 Pedestrian Collisions by Driver Age (2006)



As Figure 8, illustrates, licensed drivers aged 16-19, have among the highest rates for driver involvement in pedestrian collisions. Licensed drivers aged 81 and over have the highest rates for driver involvement in pedestrian collisions followed by drivers aged 76-80. As we age our skills and abilities decline, affecting all activities of daily living, including driving and walking. Older adult drivers have many years of driving experience from which to draw upon to respond to various scenarios. Limitations to the physical and cognitive abilities and skills of some older adults challenge the benefits of their experience. Older adult drivers can choose to support these limitations by enhancing their existing skills and abilities,[ii] through initiatives such as the Seniors Safe Driving Program.[iii] The 16-19 age group are newly licensed drivers, beginning to develop their driving skills and gain experience. It is expected the 16-19 age group would be involved in slightly more collisions.

The statistics (1986-2006) identified that males have higher rates of pedestrian collisions as drivers than females.[iii]

Identifying groups that may be more prone to pedestrian collisions is one factor to consider when investigating crosswalk safety. Other areas include driver manoeuvres, pedestrian actions, and conditions at the time of the collision.

PEDESTRIAN COLLISIONS BY DRIVER MANOEUVRE & CONTRIBUTING FACTORS

Going straight ahead was the most reported driver manoeuvre during a pedestrian collision. It is a concern as it suggests that drivers may not be paying attention or may be traveling too fast to stop. Figures 10 and 11, charts identify the contributing factors to pedestrian collisions in marked and unmarked crosswalks in Nova Scotia.[11] In the majority of pedestrian collisions reported in Nova Scotia driver inattention/distraction is commonly a contributing factor.[iv]

[11] For a the definitions of marked and unmarked crosswalks, see Glossary of this Report iii
For a discussion on the marked and unmarked crosswalks, see "The Role of Engineering in Crosswalk Safety" 41-50.

Figure 10 Pedestrian Collisions by Vehicle Manoeuvre-- Going Straight Ahead (1986-2005)

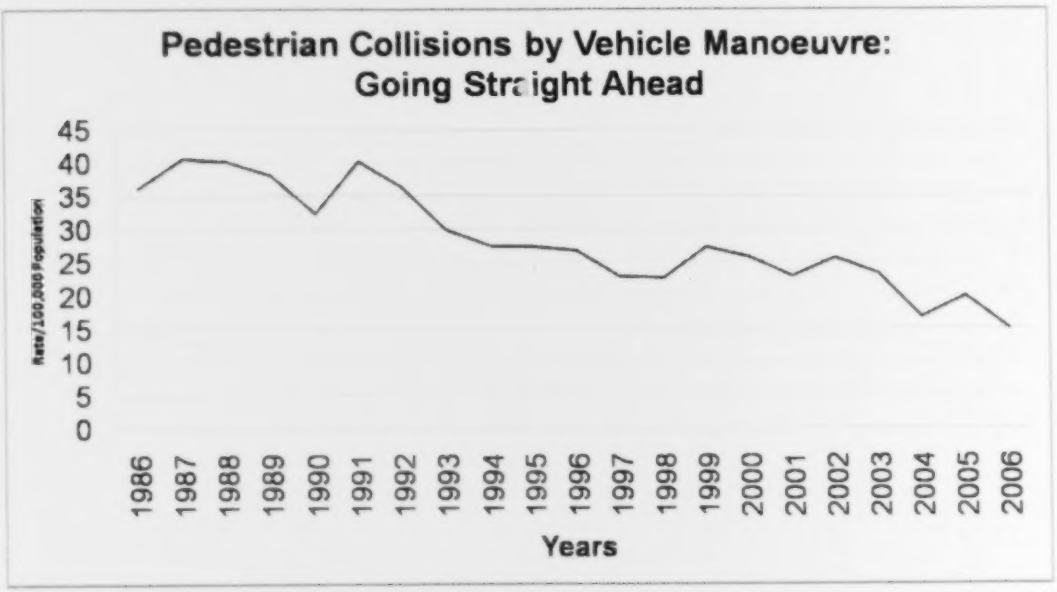
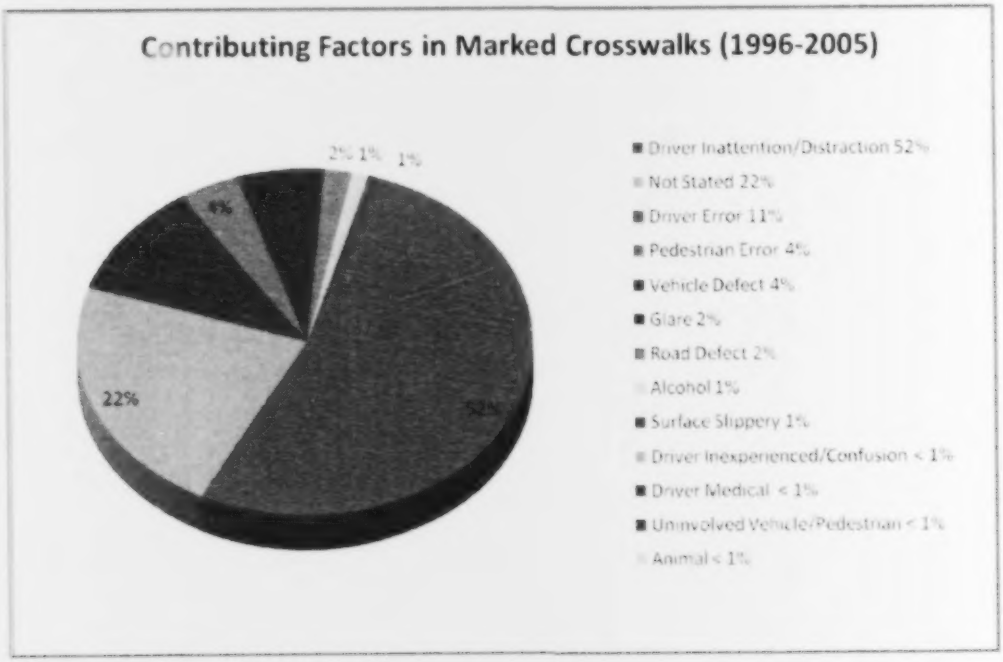


Figure 9 Contributing Factors in Marked Crosswalks (1996-2005)



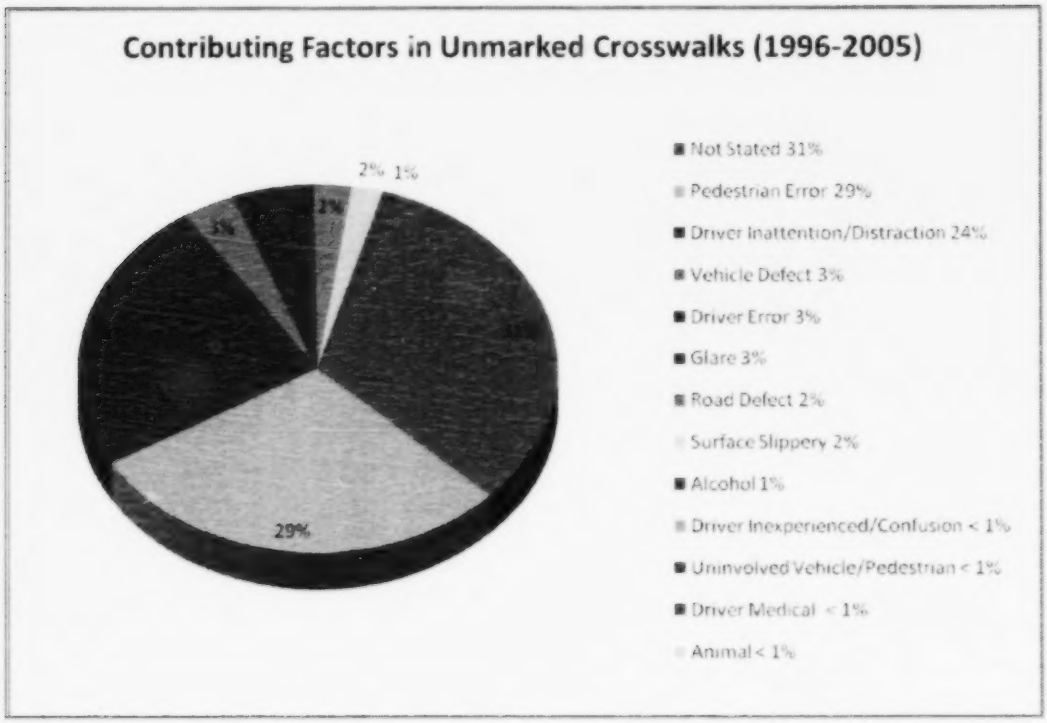
Pedestrian Collisions by Vehicle Manoeuvre:
Going Straight Ahead

Contributing Factors in Marked Crosswalks (1996-2005)

Contributing Factors in Unmarked Crosswalks (1996-2005)

Pedestrian Collisions by Vehicle Manoeuvre

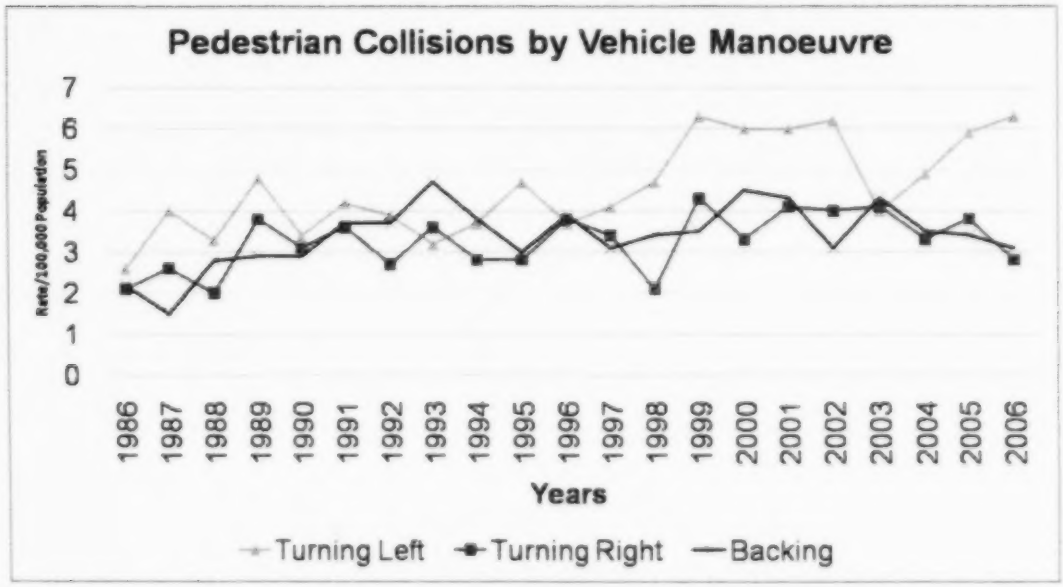
Figure 11 Contributing Factors in Unmarked Crosswalks (1996-2005)



Contrary to the decline in the "going straight ahead" manoeuvre, left or right turns and backing manoeuvres during pedestrian collisions have seen an increase. The statistics for these manoeuvres are demonstrated in the graph following.

Research has suggested some older drivers (65 a

Figure 12 Pedestrian Collisions by Vehicle Manoeuvre (1986-2006)



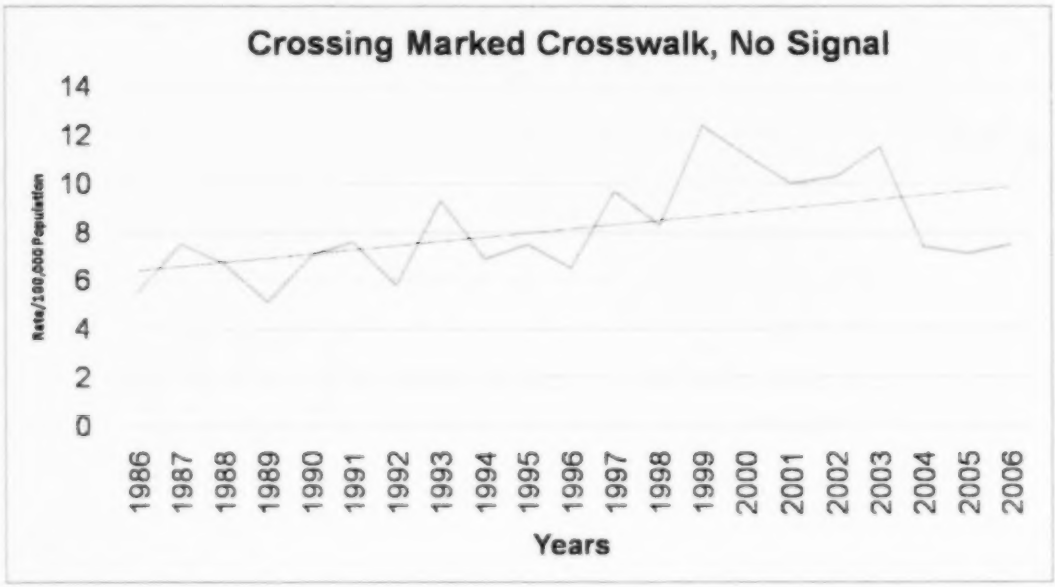
Research has suggested some older drivers (65 and older) have difficulty completing left or right turns and this may contribute to their involvement in pedestrian collisions. Nova Scotia's statistics have identified drivers aged 81 and over, have the highest rates as drivers in pedestrian collisions. Therefore, it is conceivable that drivers in this age group are experiencing physical challenges (e.g. limitations with vision, hearing, and mobility) that may be contributing to the increase in these types of manoeuvres during pedestrian collisions.[iv]

PEDESTRIAN COLLISIONS BY PEDESTRIAN ACTIONS

The following graphs are in order of highest rates of occurrence by pedestrian action over the last 21 years:

- Pedestrian collisions by pedestrian action-Crossing marked crosswalk, no signal
- Pedestrian collisions by pedestrian action-Crossing with signal
- Pedestrian collisions by pedestrian action-Crossing no signal or crosswalk[12]

Figure 13 Pedestrian Collisions by Pedestrian Action-Crossing Marked Crosswalk, no Signal (1986-2006)



[12] For the definitions of these terms, see the Glossary of this Report, iii.

Figure 15 Pedestrian Collisions by Pedestrian Action-Crossing with Signal (1986-2006)

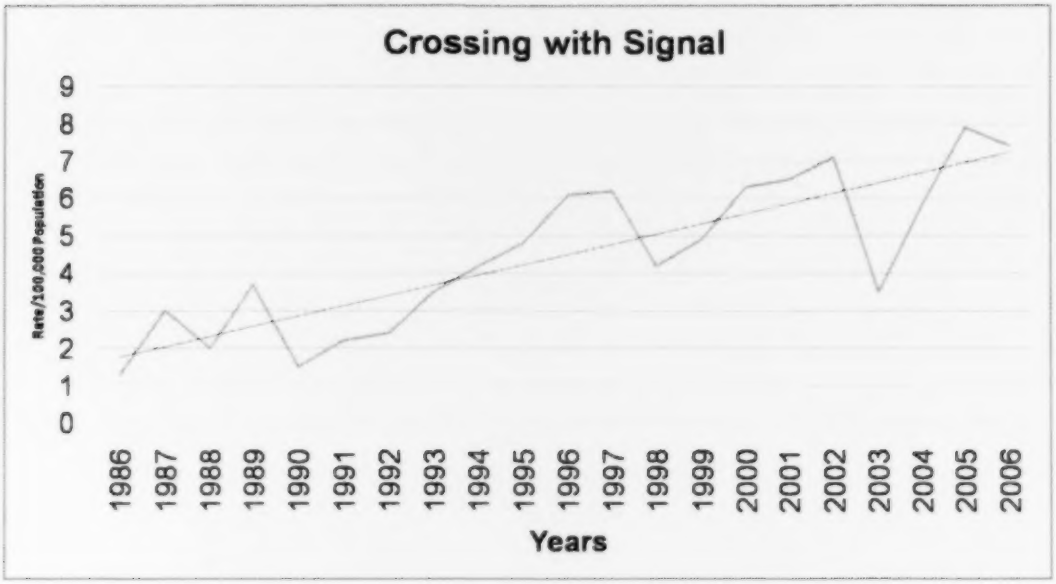
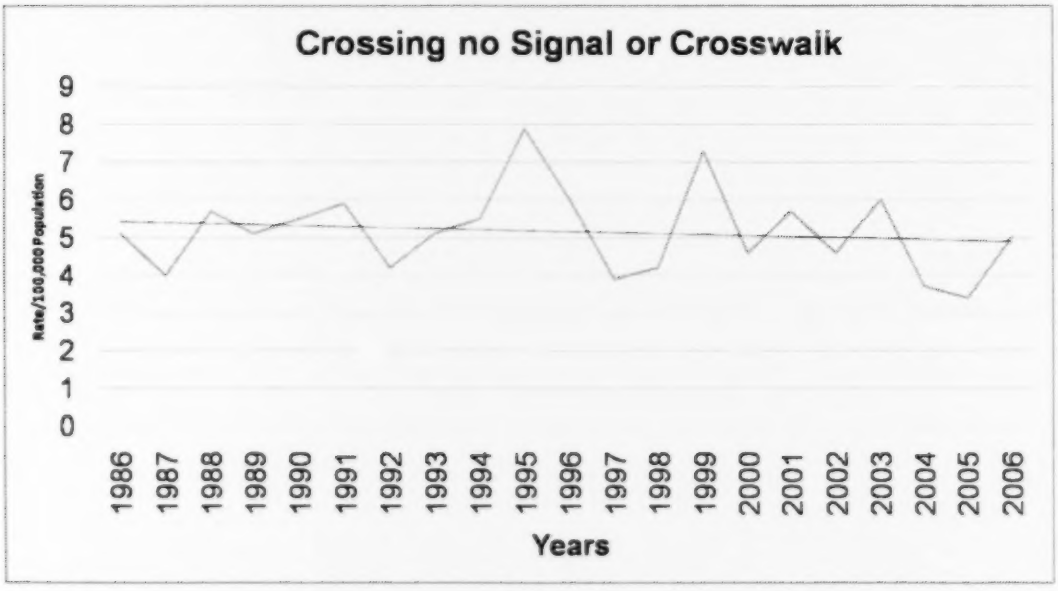


Figure 14 Pedestrian Collisions by Pedestrian Action-Crossing no Signal or Crosswalk (1986-2006)



It is important to note that there has been a significant increase in the installation of marked crosswalks since 1986. The increases in the number of marked crosswalks, pedestrians, and vehicles raises the probability of collisions at marked crosswalks and may partly explain the increase in collisions within marked crosswalks. Changes in reporting crosswalk collisions may also influence the number of crosswalk collisions captured in the statistics. Some of those reporting the incident may interpret the pedestrian action of "crossing with signal" as including flashing overhead beacons,[13] when the "crossing with signal" definition only includes the "walk" and "don't walk" signals. This would change the data for that action making it seem more prevalent than it actually is.

The most apparent trend is that pedestrians continue to be involved in collisions, even when they are crossing at pedestrian facilities. There are a number of possible explanations for this discussed throughout this Report. A review of the literature suggests that some pedestrians are complacent and overconfident regarding marked crosswalks and may not pay attention to traffic. Drivers may also be complacent to crosswalk treatments, because they become accustomed to marked crosswalks with no pedestrians present.[lvi]

Pedestrian Collisions by Conditions

The statistical analysis of pedestrian collisions by conditions indicated that most vehicle collisions occur:

- during the daylight,
- on clear days,
- on dry road surfaces.

This runs contrary to what most people would think. It is possible that these conditions are not encouraging pedestrians and drivers to take enough precautions regarding crosswalk safety, contributing to pedestrian collisions.

Australian research on child and youth pedestrian behaviours has identified the following common factors involved in collisions:

- *in residential streets*
- *close to home (within 2 km)*
- *while the child is not supervised*
- *on the way home from school and playing after school*
- *between intersections*
- *on straight road sections with little or no gradient*
- *in fine weather conditions*
- *where cars are parked in the vicinity of the point of entry to the road.*[lvii]

[13] For a full discussion on types of pedestrian facilities, see "The Role of Engineering in Crosswalk Safety" of this Report, 41-50.

The Task Force cannot confirm that these same factors are contributing to child and youth pedestrian collisions in Nova Scotia. However, the literature review and additional research confirm that children and youth have developmental challenges predisposing them to collisions where these factors are involved.[lviii]

Pedestrian Collision Statistics Summary

As with all statistics it is essential to recognize their limitations prior to making any conclusive statements. Analyzing these particular pedestrian collision statistics is difficult due to limitations in the Production Database's capabilities. It is very difficult to extract raw data from the Production Database to enable cross tabulation. Additionally, key pieces of information are not readily available, such as the average distance travelled by drivers, if the pedestrian was impaired (alcohol, medication, illness), and whether the pedestrian looked before crossing.

The statistics analyzed for the Task Force do show some interesting trends that are of concern, but do not provide enough detail on why these trends are occurring. The literature reviewed provides some potential reasons for these trends, but there is a lot left to speculation. Further investigation is needed.

The Department of Health Promotion and Protection and Emergency Health Services, *Nova Scotia Injury Prevention Strategy: Report and Recommendation* (*Injury Prevention Strategy Report*) also identified the current methods of collecting and analyzing data was a concern. The current systems do not enable the ability to do a comprehensive and meaningful analysis of collision information. This impedes the abilities of RSAC member departments to develop targeted engineering, education, and enforcement strategies to improve road and crosswalk safety.

The following quotation from the *Injury Prevention Strategy Report* demonstrates the importance of quality information:

> *The lack of timely, comprehensive, standardized, consistent, and accurate injury data has long been recognized by the injury prevention community... there is little ability to link these systems and share information. A[n] example of this is evident with the collection of data related to motor vehicle collisions. While the Department of Transportation [and] Public Works (TPW) collects and analyzes data on fatal motor vehicle collisions, they are prohibited from sharing the specifics of each case with the Nova Scotia Trauma Registry which collects and analyzes comprehensive data on injury related deaths (including motor vehicle collisions). The end result is that neither database contains all of the critical facts surrounding each fatal motor vehicle collision. What the TPW database lacks in specific injury related data (i.e. types and severity of injuries sustained), the Nova Scotia Trauma Registry lacks in relation to the detailed causes of the crash (i.e. alcohol involvement, vehicle impacts etc).*[lix]

Therefore, the Task Force recommends:

2. GOVERNMENT MUST UNDERTAKE A REVIEW OF THE CURRENT METHOD OF COLLISION DATA COLLECTION AND MAINTENANCE TO IMPROVE THE ACCURACY AND RELIABILITY OF THE DATA.

INTERIM REPORT OF THE CROSSWALK SAFETY TASK FORCE

The responsibilities of the Task Force were to:

- review all relevant research, reports and background materials;
- solicit presentations from experts and stakeholders (as required);
- document relevant past and current rules, programs and practices that support crosswalk safety including, but not limited to:
    - legislation, engineering, public awareness and education, enforcement, and emergency response; and
- prepare an interim report and a final report.[14]

In August 2007, the Task Force published the *Interim Report of the Crosswalk Safety Task Force* (*Interim Report*). The objective of the *Interim Report was* to inform Nova Scotians of the Task Force's structure and purpose, activities to date, and provide rationale for the legislative recommendations contained within the Report.

In preparation of the *Interim Report,* the Task Force considered the results of its work undertaken between April and July 2007; which included completing a comprehensive literature review, legislative review, public comments review, and consideration of presentations.[15] The Task Force concluded in the *Interim Report* that crosswalk safety is a shared responsibility between drivers and pedestrians that is contingent upon each respecting the rules of the road.

The Task Force paid particular attention to understanding the present legislation governing crosswalk safety, as it was the main objective of the *Interim Report*. Jurisdictional and literature reviews pertaining to legislation were consulted as well as the solicitation of presentations of those who had expertise in crosswalk legislation and enforcement.

The Task Force considered the evidence provided and decided that the current legislation specific to pedestrian and crosswalk safety could be improved. Concerns stemmed from the lack of clarity that may lead to inconsistent interpretation, primarily of Section 125 of the MVA, as it pertains to pedestrian and crosswalk safety. The legislation is not up to date with the current traffic issues challenging pedestrian safety and does not clearly define the roles and responsibilities of drivers and pedestrians.

[14] The Task Force's Terms of Reference are included as Appendix A of this Report.
[15] A list of presenters and topics is included as Appendix C of this Report.

Experts identified that there are no specific prosecution issues with existing legislation; however, the Task Force believed it necessary to make legislative recommendations. These legislative recommendations are essential to the successful implementation of the remaining recommendations contained herein as they provide the legal basis for developing educational and enforcement strategies.

The Task Force advanced the following legislative recommendations specific to Sections 93 and 125 of the MVA.

The Task Force recommended that MVA Section 125, include a definition for yielding to a pedestrian similar to the following:

"Yield the right of way to a pedestrian" means the operator of a vehicle is required to stop to avoid endangering, colliding with or interfering in any way with pedestrian travel."[8]

The Task Force recommended that Section 93 (2) (i), the don't walk light definition, be amended to clarify the existing legal obligations for pedestrians to not begin crossing when the flashing don't walk signal has begun. The Task Force recommended the following statement:

'don't walk' light - Pedestrians facing this signal, either flashing or solid, shall not start to cross the highway in the direction of the signal; and pedestrians who have legally and partially crossed the highway shall continue to proceed and complete their crossing."

The Task Force also recommended amendments to Section 125 to clearly state expectations and legal obligations and divide responsibility for crossing safety between drivers and pedestrian.

Driver Responsibilities

- Where pedestrian movements are not controlled by traffic signals, the driver of a motor vehicle shall yield the right of way to the pedestrian lawfully within a crosswalk or stopped facing the crosswalk.
- Whenever a vehicle has stopped at a crosswalk or at an intersection to yield to a pedestrian pursuant to subsection (1), it shall be an offence for the driver of any other vehicle approaching from the rear to overtake and pass the stopped vehicle.
- Where directional flow of traffic on a highway is divided into two separate roadways by a defined median, the driver of a motor vehicle shall yield the right of way to a pedestrian lawfully within a crosswalk or stopped facing the crosswalk on the half of the highway on which the vehicle is traveling.
- This Section shall not relieve the driver of a vehicle from the duty to exercise due care.

Pedestrian Responsibilities

- A pedestrian shall stop and not leave a curb or other place of safety and walk or run into the path of a vehicle that is so close that it is impracticable for the driver of the vehicle to yield.
- Every pedestrian crossing a roadway at any point other than within a crosswalk shall yield the right of way to vehicles upon the highway. Where a pedestrian is crossing a highway that has a pedestrian activated signal, the pedestrian shall ensure the signal is activated prior to crossing.
- This Section shall not relieve the pedestrian from the duty to exercise due care for their own safety.

THE ROLE OF ENGINEERING IN CROSSWALK SAFETY

Engineering is a critical component in crosswalk safety. The main objective of engineering is to design roadways and crosswalks to encourage drivers and pedestrians to make safe decisions in order to reduce collisions.[lxi]

CROSSWALK INSTALLATION PRACTICES IN NOVA SCOTIA

A crosswalk is defined by the Nova Scotia MVA as "that portion of a roadway ordinarily included within the prolongation or connection of curb lines and property lines at intersections or any other portion of a roadway clearly indicated for pedestrian crossing by lines or other markings on the surface". It can be interpreted from this definition and Section 125 of the Act that "unmarked" crosswalks exist at every intersection and that pedestrians have the right of way in these locations.

Despite the provision that crosswalks exist at every intersection, there are areas where additional devices and markings are helpful, both to draw driver attention to the crosswalk and to encourage pedestrians to cross at a preferred location.

ESTABLISHMENT OF MARKED CROSSWALKS

Most crosswalk investigations are initiated as a request from either a municipality or the public at large. Before a crosswalk can be established, the need for the crosswalk must be demonstrated by considering the local pedestrian generators, and the traffic volume on the roadway.

Once a request for a crosswalk is received, the proposed location must be evaluated. This evaluation is undertaken by a traffic engineering practitioner and looks at the following factors:

- Vehicular traffic volumes on the roadway
- Pedestrian volumes
- Delay for pedestrians wanting to cross the road
- Road geometry, including the number of lanes
- Stopping sight distance
- Approach speed
- Collision history

In general, a marked crosswalk is deemed to be required where traffic volumes are so high that there are not enough gaps in the traffic stream to allow pedestrians to cross safely in a timely manner.

Marked crosswalks are not installed at locations with restricted sight distance or in close proximity to signalized intersections. Mid-block crosswalks are installed only when absolutely necessary.

HRM has adopted the Transportation Association of Canada (TAC) warrants for marked crosswalk installations and for the installation of traffic signals. In 1996, the Transportation Association of Canada (TAC) established new criteria related to the permitted displays for traffic signals and the province has adopted the national standards established by TAC in the MUTCDC. Over the course of time traffic and pedestrian control devices are continually upgraded to conform to these standards, including all new signal installations and rehabilitation projects. As an example any non-standard overhead crosswalk signs and devices have been replaced with the amber flashing beacons for use with overhead crosswalk signs at appropriate locations.

SCHOOL CROSSWALKS

School crosswalks may be installed when the crosswalk is primarily for the use of a student walking population to and from an elementary school or junior high school. School Crosswalks are generally supervised by an adult crossing guard during the morning, noon and/or afternoon periods when children are crossing to and from school.

School crosswalks may be treated similarly to any of the crosswalks described below with the exception that School Crosswalk (RA-3) signs replace the Pedestrian Crosswalk (RA-4) signs. The Pedestrian Crosswalk Ahead (WC-2) sign is not used in school zones that are marked with the School Area sign (WC-1).

HRM installs crosswalks within school zones when there is a requirement for a crosswalk guard irrespective of other warrants.

CROSSWALK SIGNS

Signs used for crosswalks fall into two categories: Regulatory signs, which officially mark the crosswalk and are located very close to the crosswalk itself; and Warning signs, which warn drivers that they are approaching a crosswalk ahead.

REGULATORY SIGNS

Uniform use of regulatory signs is very important to notify the driver of the presence of a marked crosswalk. These signs are detailed in the Nova Scotia Traffic Signs Regulations and are shown below. To ensure uniformity and consistency, the use of regulatory signs for crosswalks other than those shown below is not permitted.

Table 2: Regulatory Signs

		The *Pedestrian Crosswalk* sign (RA-4) is black on white and is used to indicate the location of a pedestrian crosswalk. The sign is installed on both sides of the road (RA-4L on the left side, RA-4R on the right side) such that the pedestrian symbol on each sign is walking toward the centre of the road. On two-way roads, the signs are mounted back-to back such that they appear the same from each approach.
		The *School Crosswalk* sign (RA-3) is black on white and is used to indicate the location of a school crosswalk. The sign is installed on both sides of the road (RA-3L on the left side, RA-3R on the right side) such that the pedestrian symbol on each sign is walking toward the centre of the road. On two-way roads, the signs are mounted back-to back such that they appear the same from each approach.
		The *Pedestrian Crosswalk* overhead sign (RA-5) is white on black and is used to indicate the location of a pedestrian crosswalk in areas where shoulder mounted signs alone are not considered to be adequate. Two signs are installed for each crosswalk, centered over the approach lane. These signs are internally illuminated and also cast down-lighting positioned just ahead of the crosswalk area for each vehicular approach to illuminate pedestrians.

WARNING SIGNS

The Warning signs used for crosswalks in Nova Scotia are as follows:

Table 3: Warning Signs

		The *Pedestrian Crosswalk Ahead* sign (WC-2) is black on yellow and is typically installed where there is limited visibility of the crosswalk area or in advance of a crosswalk where overhead signs are used. Normally, only the WC-2R sign is installed on right side of the road such that the pedestrian symbol on the sign is walking toward the centre of the road. On one-way or divided streets, the WC-2L may also be installed on the left side or in the median.

CROSSWALK PAVEMENT MARKINGS

The primary purpose of crosswalk markings is to guide pedestrians to the most appropriate crossing place to cross the highway and guide drivers where to stop for pedestrians. The standard crosswalk pavement markings used in Nova Scotia consist of two parallel white lines, 100-200 mm wide with a minimum separation of 2.5 m.

HIERARCHY OF STANDARD MARKED CROSSWALK TREATMENTS

As discussed earlier, crosswalks may be either unmarked or marked. Marked crosswalks can be further subdivided based on the degree of signs, markings and devices used for the crosswalk. Crosswalk treatments must be selected and implemented to ensure each location receives the most appropriate treatment. These treatments form a hierarchy from the most basic treatment of pavement markings and signs up to the most complex, that being a pedestrian activated traffic signal. These treatments are discussed in more detail in the sections that follow.

BASIC MARKED CROSSWALK

The most basic marked crosswalk consists of two white painted lines across the surface of the road with an RA-4R and RA-4L sign placed back to back on posts on each side of the crosswalk such that drivers approaching the crosswalk see a sign at each end of the crosswalk. This installation is associated with a single travel lane in each direction, with the pedestrian use primarily during daylight hours.

MARKED CROSSWALK WITH OVERHEAD LIGHTING

The basic crosswalk installation may be supplemented by Pedestrian Crosswalk overhead (RA-5) signs. This installation may be considered on crosswalks which have a high volume of night-time pedestrian use, high vehicle approach speeds and/or a collision record.

MARKED CROSSWALK WITH OVERHEAD LIGHTING AND PEDESTRIAN-ACTIVATED FLASHING AMBER BEACONS

The Marked Crosswalk with Overhead Lighting installation may be supplemented by the addition of pedestrian-activated amber beacons installed alongside of the RA-5 signs above the crosswalk. Each RA-5 sign has two flashing lights, one facing each direction. The lights flash alternately. The pedestrian actuates the lights by a pole-mounted push button. The lights must

flash for the total length of time required for vehicles to clear the crosswalk; approaching traffic must yield to the pedestrian for the entire width of the road for the pedestrian to cross safely.

Typically, highway and roadway designers only consider installing this treatment on multi-lane roads.

MARKED CROSSWALK WITH PEDESTRIAN-ACTIVATED TRAFFIC SIGNAL

This crosswalk treatment uses a standard traffic signal display to control traffic at a crosswalk. When this type of a crosswalk crosses the major road at an intersection, it is sometimes called a Half-Signal, as only the major roadway is signalized. Traffic control on the side street remains as a stop sign.

The roadway signal displays a green ball with the pedestrian signal displaying a solid hand until the system is activated. The pedestrian activates the system by pressing a button on the pole, similar to the Marked Crosswalk with Overhead Lighting and Pedestrian-activated Flashing Amber Beacons. The roadway signal display will begin to change from green through amber to red. The time required for this change to begin will vary. If the signal is coordinated with other signals in the area, then the controller must communicate with other controllers to synchronize the displays of the signals. This may take some time, depending on the number and state of other coordinated signals.

Once the vehicle signal changes to red, the pedestrian signal displays a walking person. The red ball stays on for a predetermined amount of time to allow the pedestrian to cross safely; however, part way through the red phase the pedestrian signal will change from the walking person to a flashing hand. This indicates to the pedestrian in the crosswalk that they may continue their crossing but pedestrians approaching the crosswalk should not enter the crosswalk. The flashing hand continues for a predetermined time, then the pedestrian signal changes to a solid hand and then a short time later, the roadway signal changes to green.

This type of crosswalk is considered for locations where the pedestrian volumes are high and sufficient gaps in vehicular traffic are not available to accommodate the pedestrian demand. The crosswalk is spaced within approximately 200 meters from an adjacent traffic control signal or pedestrian-activated beacon equipped crosswalk; and, where it is located at an intersection, traffic volumes do not warrant full vehicle signals.

FULLY SIGNALIZED INTERSECTIONS

A fully signalized intersection generally has marked crosswalks on all four legs, however in areas where it is anticipated that there will be very little pedestrian traffic, the marked crosswalks and pedestrian signals may be eliminated. Crosswalk installations at signalized intersections may have either pedestrian signals that are directly connected to the vehicular signals (ie. when the light is

green in a particular direction, the pedestrian is permitted to cross in that direction) or pedestrian activated whereby a button must be pushed to provide a pedestrian walk signal.

The need for full vehicular signals is determined by vehicular traffic volume at an intersection, in combination with pedestrian traffic. The preferred method for this determination is through a mathematical process developed by the Transportation Association of Canada known as the *Canadian Traffic Signal Warrant Matrix Procedure*.

UNIFORMITY AND CONSISTENCY OF TRAFFIC CONTROL DEVICES

The purpose of standards for traffic control devices is to encourage consistency and uniformity of messages conveyed to drivers, which in turn promotes the orderly and predictable movement of traffic. When there is a breakdown in this goal, drivers can become confused and safety can be compromised. The *Manual of Uniform Traffic Control Devices for Canada* (MUTCDC) was developed to encourage uniformity throughout Canada and compatibility throughout North America with respect to traffic control devices. The content of the MUTCDC is regularly reviewed and only changed when there is a demonstration of need and research establishes that a more appropriate solution is available.

The Traffic Signs Regulations made pursuant to the Nova Scotia MVA takes the guidance of the national manual further by placing in law a collection of official signs which regulate traffic flow in the province. In addition to those official signs, there are a number of other auxiliary signs, such as warning or guide signs, which are used to provide information to drivers which will aid in their decision-making.

The Minister of Transportation appointed the Provincial Traffic Authority and Deputy Provincial Traffic Authority to represent province-wide traffic issues on the Minister's behalf. The Minister may also appoint District Traffic Authorities to represent the Minister in the four Department of Transportation and Infrastructure Renewal districts within the province. Municipal Councils may appoint Local (municipal) Traffic Authorities to address traffic issues within their municipality.

The Task Force noted an inconsistent application of traffic control devices in municipalities across the province. Some appear to represent a divergence from standards and regulations in an apparent effort to improve crosswalk safety, while others serve to demonstrate a lack of knowledge with respect to standards.

This lack of knowledge may be attributable to a number of factors including structural changes in governments during the 1990's .

Prior to the mid 1990's, the province played an active role in municipal transportation infrastructure. The maintenance of provincial highways where they passed through towns and cities (designated routes) was jointly funded by the municipality and the province. The control and maintenance of new subdivision streets constructed outside of towns and cities was the responsibility of the province. As a result, the Provincial Traffic Authority maintained a more active relationship with municipalities as traffic control devices on these highways were mandated to meet provincial standards. However, after the restructuring of government programs in the mid 1990's, this cost sharing arrangement ended. The municipality, rather than the province, now manage provincially designated highways that pass through cities and towns, and any new streets constructed within municipalities. As the inventory of transportation infrastructure managed by municipalities grew, the role of the Local Traffic Authorities increased and the involvement of the Provincial Traffic Authority was reduced.

During the 1990's there was very little new hiring taking place in both provincial and municipal governments across the province. Nova Scotia is feeling this now as many of the "baby boomer" generation are preparing to retire. As these people walk out the door, a great deal of knowledge goes with them. Traditionally, smaller municipalities appoint RCMP law enforcement officers to act as their traffic authorities. By nature of the RCMP structure, postings are generally short term resulting in frequent turnover in the traffic authority role. The Task Force sees these two factors as contributing to the problem of the inconsistent application of traffic control principles.

The Task Force believes that an active relationship between municipal and provincial traffic authorities is essential to ensuring the consistent and uniform treatment of traffic control related issues within the province and recommends:

3. **PROVINCIAL AND MUNICIPAL TRAFFIC AUTHORITIES SHOULD MEET ON A REGULAR BASIS TO DISCUSS, AMONG OTHER TRAFFIC ENGINEERING TOPICS, PEDESTRIAN AND CROSSWALK SAFETY.**

MARKING OF CROSSWALKS

As discussed earlier, by legal definition, a crosswalk exists at every intersection whether marked or unmarked. Unfortunately, public perception is that marked crosswalks are universally safer than unmarked crosswalks and therefore should be installed wherever there are pedestrians wishing to cross the road. They view the markings as proof that they have a right to share the roadway, often think that a driver can see the crosswalk markings as well as they can, and assume that it will be safer to cross where drivers can see the white crosswalk lines. This poses a problem for elected officials as it is often difficult to counter public pressure where a perception exists that certain interventions will improve safety, whether or not that is indeed the case.

The debate regarding the relative safety of marked versus unmarked crosswalks at locations not controlled by a traffic signal or stop sign has been going on for many years. It has been theorized that pedestrians may be more at risk at marked crosswalks because they assume a certain entitlement to cross where there are pedestrian markings.

A 1972 study looked at a large number of crosswalks in San Diego, California and determined that there was an increase in pedestrian collisions at marked locations. However, it did not conclude that all marked crosswalks are unsafe and has often been misquoted or misused to construe that impression.[lxii] There have been other studies done since then, but they were generally inconclusive. A 2005 report, by the United States of America (US) Federal Highways Administration (FHWA)[lxiii] concluded," that under no condition was the presence of a marked crosswalk alone at an uncontrolled location associated with a significantly lower pedestrian crash rate compared to an unmarked crosswalk".[lxiv]

Nevertheless, marked crosswalks do have their place at certain uncontrolled locations. Pedestrians have the right to cross the highway without unreasonable delay. In certain situations, it is desirable to direct pedestrians to a marked location for crossing and provide drivers with visual cues that pedestrians may be crossing at this location. To determine the appropriate crossing treatment for a particular location, an engineering study must be conducted. The TAC Pedestrian Crossing Control Manual suggests the following factors should be considered in this study:

- Collision history
- Pedestrian volumes
- Pedestrian age and ability
- Roadway width
- Vehicle volumes
- Vehicle speeds
- Sight distance and visibility conditions
- The proximity of nearby pavement markings, signs and/or signals

There are a number of possible treatments for pedestrian crossings ranging from unmarked to fully signalized. It is important to apply these treatments judiciously, by matching the crossing system with the conditions found at the crossing location. Applying an overabundance of engineering controls and devices to a location where they are not warranted may only serve to foster a disregard for those devices at locations where they are needed.

Over time, neighbourhoods change and the factors that warranted the establishment of a marked crosswalk may change as well. For instance, if a school was in place in a neighbourhood at the time when a marked crosswalk was established, and that school is later closed or changes function, the need for the marked crosswalk may no longer be there.

The Task Force supports the hierarchical approach to marking crosswalks and recommends:

4. TO ENSURE CONSISTENCY AND UNIFORMITY ACROSS THE PROVINCE IN THE INSTALLATION OF MARKED CROSSWALK TREATMENTS, THE PROVINCE AND MUNICIPALITIES MUST USE A CONSISTENT APPROACH, BASED ON TECHNICAL MERIT.

5. THE ROAD AUTHORITY MUST REQUIRE THE ASSESSMENT OF EXISTING MARKED CROSSWALKS WHEN REFURBISHING HIGHWAYS AND ROADWAYS TO ENSURE THEY REFLECT CURRENT TRAFFIC SITUATIONS, GUIDELINES, AND STANDARDS. WHERE EXISTING MARKED CROSSWALKS ARE NOT WARRANTED THEY MUST BE REMOVED DUE TO POTENTIAL SAFETY HAZARDS.

ACTIVE TRANSPORTATION

Mobility is a very important value in today's society. In the past, transportation focus has been on the automobile. However, with the rising environmental, social and economic costs of vehicle travel and the focus of more active lifestyles, active transportation is expected to become a more popular way to get around.

For pedestrians, cyclists and others to safely operate in concert with vehicles, the design of transportation infrastructure must look at the total transportation picture, rather than just focusing on motorized travel. By including all users of the transportation network, individual components can function in harmony as a complete system. The Task Force therefore recommends:

6. PRIOR TO CONSTRUCTION, DESIGNERS OF HIGHWAYS, ROADWAYS, AND STREETSCAPES MUST EXAMINE THE NEEDS OF ALL ROAD USERS TO ENSURE THAT THE FINAL PRODUCT PROVIDES APPROPRIATE AND SAFE FACILITIES FOR ALL ROAD USERS.

NEW TECHNOLOGY

There are many new traffic control technologies available that are advertised to offer enhanced safety. However, before widespread implementation of a new technology, it is important to ensure the product has been fully evaluated to determine its benefit as well as its shortcomings. Often, a product which appears to be a solution to a problem may exhibit some unanticipated negative results when tested in the field.

A 2006 report by the Transit Cooperative Research Program (TCRP) and the National Cooperative Highway Research Program (NCHRP)[lxv], studied a number of treatments for improving unsignalized pedestrian crossings and provided general guidelines for the selection of these treatments.

This report dealt with treatments which are used in the US. Some of these treatments, such as signs or markings, differ (and in some cases may be a lower standard) from what is currently used in Canada. For instance, the US Manual of Uniform Traffic Control Devices (MUTCD) currently does not require pedestrian crossing signs similar to Canada's RA-4 to be used at all marked crosswalks. That being said, the guidance contained in this Report should be reviewed by Traffic Authorities.

Where a treatment is considered to be an improvement over current practices, it should be pilot tested to confirm its efficacy. When a new product or technique is evaluated and is found to be successful, it is important to share these findings with not only traffic authorities within Nova Scotia, but other jurisdictions in Canada as well.

Therefore, the Task Force recommends:

7. THE PROVINCE AND MUNICIPALITIES MUST STAY CURRENT IN THEIR KNOWLEDGE OF NEW CROSSWALK AND PEDESTRIAN CONTROL DEVICES AND MONITOR THE SUCCESS OF THESE DEVICES. THE PROVINCE MUST ENCOURAGE AND APPROVE PILOT PROJECTS PRIOR TO THE USE OF THE DEVICE TO DETERMINE ITS DURABILITY, INSTALLATION AND MAINTENANCE REQUIREMENTS, EFFECTIVENESS, AND FEASIBILITY.

8. MUNICIPALITIES INTERESTED IN CONDUCTING A PILOT PROJECT MUST SEEK APPROVAL FROM THE OFFICE OF THE PROVINCIAL TRAFFIC AUTHORITY, AS ALL PILOT PROJECTS MUST BE SUBJECT TO AN APPROVAL PROCESS.

9. THE PROVINCE AND MUNICIPALITIES PROVIDE FIXED FUNDING TO BE ALLOCATED FOR THE PURPOSES OF RESEARCH AND PILOT TESTING OF CROSSWALK DEVICES.

Conducting pilot projects assists in determining the durability, installation and maintenance requirements, effectiveness, and feasibility of the device within Nova Scotia's culture and climate. The approvals of pilot projects are essential as they may have legislative or regulatory implications for the province.

THE ROLE OF EDUCATION IN CROSSWALK SAFETY

The effectiveness of the design of a roadway and crosswalk installation is greatly dependent upon the driver and pedestrian's knowledge and compliance with rules of the road. This knowledge of road and crosswalk safety depends upon Nova Scotians awareness and attitudes towards the rules of the road and the consequences of their behaviours. The objective of road safety and crosswalk education is to make "road users aware of the risks associated with violating road traffic laws" by encouraging safe driver and pedestrian behaviours.[lxvi]

CROSSWALK EDUCATION IN NOVA SCOTIA

While driving and walking across a road may seem like ordinary activities, it takes time, practice, experience and knowledge to do both effectively and safely.

The Task Force has discussed throughout the Report the three "E's" of education, enforcement, and engineering as key factors to consider in improving crosswalk safety.

There are defined risk factors for drivers and pedestrians where targeted education can play a role - to help change attitudes, and help develop and/or refine critical behaviours to reduce the risk of a crosswalk collision.

While research shows that education alone can have mixed results, the effectiveness of all evidence-based education strategies is stronger when integrated into a larger strategy that includes evidence-based engineering and enforcement initiatives.[lxvii]

The goals of crosswalk safety education are:

- to help drivers and pedestrians understand the risks involved when a person crosses the road, and the consequences of injury.
- to help drivers and pedestrians understand the rules and laws around crosswalks.
- to help drivers and pedestrians develop and maintain behaviours that reduces their risk of a collision in a crosswalk.

While each goal has its own challenges, the third is the most difficult, because skill development and behaviour change are involved.

From a driver point-of-view the objective is to develop and maintain appropriate driving behaviours that decrease the risk of all collisions - not just collisions with pedestrians; or change a

number of dangerous behaviours that increase the risk of all collisions - not just collisions with pedestrians. These modifiable factors include impaired driving, speeding and driver distractions.

There are behaviour changes to consider with pedestrians as well. Pedestrians are increasingly distracted with cell phones and other electronic devices, or some people simply choose to cross roads in a risky way. Some also assume a situation is safe when it is not, such as at a signalized and marked crosswalk while forgetting about other factors such as driver distraction and inattention.

CROSSWALK EDUCATION THROUGH ONE'S LIFESPAN IN NOVA SCOTIA

Developmental psychologists in examining how behaviour develops have concluded that our behaviours and the way we act are the result of a complex interaction of many factors including:

- our environment, our memory, our knowledge of highway safety,
- our ability to attend to relevant information,
- our ability to make decisions and the speed at which we can process information, our age,
- our sensory abilities and the way we feel about ourselves.

All of these factors contribute to how we see ourselves, our ability to monitor and consequently regulate our behavior and the decisions we make.[xviii]

While Sidney William Bijou, a pioneer in applied behaviour psychology, argues that we respond to situations based on prior learning, others such as R. Case argue that we interpret and make decisions using a variety of information and factors. In either theory, we are learning how to perform a particular behaviour, we are acquiring new knowledge and putting that into effect and through that learning we are changing the ways we behave.[xix]

Some of the factors that influence learning include:

- Heredity/genetic
- Emotional condition
- Maturational or developmental level
- Environmental stimuli
- Metacognitive[16] abilities of the individual

[16] Metacognitive: ability to monitor and consequently regulate one's behaviour which includes a person's awareness of the relationship between what they know and their ability to understand, control, and adapt their thinking process to a situation.

Psychological studies have identified that the way we monitor and consequently regulate our own behaviour is a cognitive act that involves our knowledge about how we think, how we learn, how we recall information and how we think about cognition.[lxx] More importantly to the present task of crosswalk safety, it involves knowledge of which information processing strategies are effective in which situation and it enables a person to assess how difficult a problem or situation will be in order to plan appropriate ways to approach it.[lxxi]

Clearly, learning is a complex process affected by many variables and factors including age related changes (e.g., children make use of metacognitive knowledge in less effective ways at younger ages). The information gathered through the literature review and additional research on crosswalk safety best practices provided few answers on the best approach to reducing crosswalk safety injuries through education.[lxxii]

Some common themes are evident though, and are similar to other areas of public health where education has a role.

Education should be comprehensive, and targeted with the right resources for the right audience, and delivered at the most appropriate time and in the most appropriate way.

Education should also consider how the social determinants of health[17] can be barriers to reaching certain target groups.[lxxiii]

Another theme is the importance of crosswalk safety education throughout the lifespan of both drivers and pedestrians, and while this is connected to the theme of comprehensive education, some groups of drivers and pedestrians are more vulnerable.[lxxiv]

While all pedestrians are at risk, and all drivers have the potential to injure someone in a crosswalk, the data and literature suggests education is most critical for a number of target groups:

- Pedestrians ages 5 – 9
- Pedestrians ages 16 – 19
- Drivers ages 16 – 19
- Drivers age 76 and older

A comprehensive crosswalk safety strategy in Nova Scotia should give priority to these groups most at risk.[lxxv]

The following chart describes age groups and some of the areas of where support may be required.

[17] The social determinants of health commonly include the following income inequality, social inclusion and exclusion, employment and job security, working conditions, contribution of the social economy, early childhood care, education, food security, and housing.

Table 4: Characteristics & Abilities of Different Pedestrians[18]

Young Children

At a young age, children have unique abilities and needs. Since children this age vary great in ability, it is important for parents to supervise and make decisions on when their child is ready for a new independent activity. Young children

- Can be impulsive and unpredictable,
- Have limited peripheral vision and [cannot locate] sound source easily,
- [Are usually farsighted and have more trouble discriminating objects],
- [Have more limited and effective planning abilities until about age 8],
- Have limited training and lack of experience,
- Have poor gap/speed assessment,
- Think grown-ups will look out for them,
- Think close calls are fun,
- Are short and hard to see,
- Want to run and desire to limit crossing time, and
- Like to copy the behaviour of older people.

Preteens

By middle school years, children have many of their physical abilities but still lack experience and training. Now there is greater desire to take risk. Preteens

- Lack experience,
- Walk and bicycle more and at different times (higher exposure),
- Ride more frequently under risky conditions (high traffic),
- Lack positive role models,
- Walk across more risky roadways (collectors and above), and
- Are willing to take chances.

High School Age

By high school and college age, exposure changes and new risks are assumed. Many walk and bicycle under low-light conditions. High school children

- [Potentially] are very active and [may] go long distances and to new places ;
- Feel invincible;
- Still lack experience and training;
- Are capable of traveling at higher speeds;
- Will overestimate their abilities on hills, curves, etc.;
- Attempt to use bicycles and in-line skates based on practices carried over from youth; and
- Are willing to experiment with alcohol and drugs.

[18] Adapted from Kay Fitzpatrick et al, *Improving Pedestrian Safety* 12-13. The statistics identified in this chart are specific to the United States of America.

Novice Adults

Adults who have not walked and bicycled regularly as children and who have not received training are ill-prepared to take on the challenges of an unfriendly urban environment. For novice adults,

- 95 percent of adults are novice bicyclists,
- Many are unskilled in urban walking,
- Drinking can influence their abilities,
- Many assume higher skills and abilities than they actually have, and
- Most carry over sloppy habits from childhood.

Proficient Adults

Proficient adults can be of any age. They are highly competent in traffic and capable of perceiving and dealing with risk in most circumstances. Some use bicycles for commuting and utilitarian trips, while others use bicycles primarily for recreation. Proficient adults

- Comprise only 1 to 4 percent of the bicycling population in most communities,
- Tend to be very vocal and interested in improving conditions, and
- May be interested in serving as instructors and role models.

[Older] Adults

[Older] adults, ages 60 and up, begin a gradual decline in physical and physiological performance, with a rapid decline after age 75. Many are incapable of surviving serious injuries. These changes affect their performance. For [older adults]. They walk more in older years, especially for exercise/independence;

- Many have reduced income and therefore no car;
- All experience some reduction in vision, agility, balance, speed, and strength;
- Some have further problems with hearing, extreme visual problems, and concentration;
- Some tend to focus on only one object at a time;
- All have greatly reduced abilities under low-light-night conditions; and
- They may overestimate their abilities.

[Persons] with Disabilities

[Persons with disabilities, whether permanent or temporary (e.g. broken leg) may have a number of challenges that may include:

- Loss of hearing or hard of hearing ;
- Vision loss or loss of sight;
- Mental health issues;
- Intellectual disabilities;
- Physical limitations and/or disabilities;
- Lack of pedestrian education and experience;
- Side effects from prescription medications; and/or
- alcohol and/or illegal drug dependency.]

THE NEED FOR A COMPREHENSIVE EDUCATION PLAN

The Halifax Chamber of Commerce (January, 2007) in the Crosswalk Safety Awareness Forum concluded that change was necessary in order for there to be continual improvement in personal and community safety. It recommended an ongoing safety program tied to public education, the school curriculum, awareness and public relations programs as well as enhancements to enforcement, conviction and engineering. As noted in that Forum, education takes time to effect change with more than single events such as a safety lecture being necessary. Drawing on this background, the Task Force examined opportunities and challenges for children and youth, opportunities and challenges in educating drivers and adult pedestrians, and the role of the Registry of Motor Vehicles and their safety education division with regard to educational programs.[lxxvi]

OPPORTUNITIES & CHALLENGES FOR EDUCATING CHILDREN & YOUTH ON CROSSWALK SAFETY

Crosswalk safety education can start at an early age, with lessons from parents, family members and others long before a child enters school. While this pre-school education may be informal, watching parents and other family members model good pedestrian behaviour is a good foundation for more education later on in childhood.[lxxvii]

Research raises concerns about the cognitive ability of younger children, under age nine, to translate pedestrian safety knowledge into safe pedestrian behaviour. This does not mean crosswalk safety education at a young age is not worthwhile, but it speaks to the need for more active supervision by parents, guardians and older family members to reduce the risk of injury in crosswalks for younger children; while at the same time setting good examples as pedestrians themselves. Research also suggests there are physical issues too, particularly with eyesight and depth perception that may place younger children at greater risk when crossing the street on their own.[lxxviii]

Some parents and guardians may be unaware of the challenges that confront children when crossing the street or learning crosswalk safety, especially at a younger age. They may also be over confident in their child's abilities to cross the road safely. Moreover, children with Attention Deficit Hyperactivity Disorder (ADHD) or learning challenges require additional educational supports to enhance and support the child's abilities and skills. Some studies indicate children with ADHD have a higher risk of severe injury when involved in pedestrian collisions. Some children with intellectual and/or developmental disabilities may have different challenges to learning pedestrian related

skills, because of the strong relationship between their developmental stage and practicing pedestrian safety. Parents and educators need to be cognizant of the challenges confronting children when learning new skills.[lxxix]

The Task Force recommends that:

10. PARENTS, FAMILY MEMBERS, AND OTHERS WHO HELP CARE FOR YOUNG CHILDREN NEED SUPPORT THROUGH THE PROVISION OF APPROPRIATE EDUCATIONAL RESOURCES TO HELP THEM DEVELOP AND ENCOURAGE SAFE CROSSWALK BEHAVIOUR IN THIS VULNERABLE YOUNG AGE GROUP.

A Task Force member consulted HPP on this matter and HPP committed to including crosswalk safety on their website momsanddads.ca.

Once children enter school, there are a number of opportunities to provide crosswalk safety education. Traditionally, many schools have relied on police and others with expertise in road safety to visit classes and speak with students about crosswalk safety. In Nova Scotia, there are curriculum outcomes in each grade, from Primary to 12, where injury and safety issues can be addressed. Injury among children and youth is a significant public health issue, with many risks besides crosswalks to consider.

The Department of Education, in partnership with HPP, are presently looking at all of these curriculum outcomes to ensure that the best possible injury prevention resources can be provided to teachers and students. Crosswalk safety will be considered along with other injury issues for children and youth, particularly where the data suggests a vulnerable age group. The overall goal is to help all children and youth understand the consequences of risk and injury in all parts of their lives; and to promote active and healthy lifestyles while reducing the risk of serious injury.[lxxx]

Nova Scotia is fortunate to have a Health Promoting Schools initiative that is working to support a range of public health initiatives in schools across the province. Health Promoting Schools is a partnership between the Department of Education, HPP, school boards and district health authorities. Together they ensure that resources are evidence-based, age appropriate, inclusive for all children and consider the need for reinforcing critical health messages.[lxxxi] One of the problems with crosswalk safety education, particularly for children and youth, is a lack of evaluation of existing resources and strategies that make it difficult to say one resource or strategy represents a best practice. Some promising practices do exist though, and they need further study and evaluation.

Therefore, the Task Force recommends:

11. THE DEPARTMENT OF EDUCATION (DOE) DESIGNATE A PERSON TO JOIN RSAC TO PROVIDE SUPPORT AND EXPERTISE ON EDUCATION ISSUES RELATED TO SCHOOL AGE CHILDREN AND YOUTH TO ENSURE THE CURRICULUM INCORPORATES CROSSWALK SAFETY EDUCATION.

The Task Force recognizes the importance of supporting curriculum development that promotes injury prevention in all areas, including crosswalk safety. Therefore, the Task Force recommends:

12. THE DEPARTMENTS OF TRANSPORTATION AND INFRASTRUCTURE RENEWAL (TIR) AND HEALTH PROMOTION AND PROTECTION (HPP) SHOULD SUPPORT THE DEPARTMENT OF EDUCATION (DOE) IN REVISING EXISTING AREAS OF CURRICULUM WHERE INJURY AND SAFETY IS A FOCUS, AND WHERE CROSSWALK SAFETY EDUCATION IS AN AREA OF CONCERN.

Research tells us that fewer children and youth are walking to and from school and walking in their community, so there is likely value in having more formal crosswalk safety education opportunities available in our schools, and elsewhere, where appropriate crosswalk skills can be developed, encouraged and practiced.[lxxxii]

For those children who do walk to school, crossing guards play an active role in educating children and youth about crosswalk safety. It is important that crossing guards are recruited, trained, supervised, and evaluated to ensure they are reinforcing safe crossing behaviours.[lxxxiii] Therefore, the Task Force recommends:

13. REVIEW NOVA SCOTIA'S CROSSING GUARD TRAINING PROGRAM TO CREATE A STANDARD PROGRAM THAT CLARIFIES THE CROSSING GUARD'S ROLE IN CROSSWALK SAFETY EDUCATION FOR CHILDREN.

Crossing guards are just one target group for more training and education relating to crosswalk safety. There are opportunities for professional development with a number of other groups as well - including police, driving schools, and others who have a potential role in transferring knowledge to others about crosswalk safety issues.

OPPORTUNITIES & CHALLENGES: EDUCATING DRIVERS & ADULT PEDESTRIANS

It is important to recognize that crosswalk education is not just for children and youth; and schools are not the only setting for crosswalk safety education. Community-based and workplace-based education are two other settings to consider.[lxxxiv]

Research points to the need for education strategies for all persons, with unique programs developed for seniors, people with disabilities and all drivers. Such a process speaks to the need for cooperative community based programs.[lxxxv]

The literature review and additional research identified licensed older adults are a target audience requiring crosswalk safety education. Some of the factors that may increase the risk of collision for an older senior driver are no different from other drivers, and may be modifiable, for example,

speed, distractions and impaired driving. Other factors may pose a greater challenge. As we age there can be some physical and cognitive changes that increase the risk of all collisions, not just collisions with pedestrians.[xxxvi] This area requires further attention and study by the RSAC member departments.

The Task Force recommends:

14. THE RSAC MEMBER DEPARTMENTS SHOULD CONSIDER AGE-RELATED CHANGES TO DRIVING ABILITY AND DRIVER COMPETENCY WHEN DEVELOPING A PROVINCIAL ROAD SAFETY STRATEGY.

Age-related changes can also affect the safety of older adults as pedestrians, where hearing and vision deteriorate and put older adults at greater risk.

The Task Force recommends:

15. THE RSAC MEMBER DEPARTMENTS SHOULD CONSULT WITH THE DEPARTMENT OF SENIORS, AND OTHER SENIORS' ORGANIZATIONS TO IDENTIFY OPPORTUNITIES FOR DRIVER-EDUCATION TO SUPPORT OLDER ADULTS TO CONTINUE TO DRIVE SAFELY AND REINFORCE THE RULES OF CROSSWALK SAFETY.

With regard to seniors as pedestrians, other jurisdictions (specifically Australia and the United States) have developed programs specific to older adults.[xxxvii] This area needs further study, as most programs have not been evaluated.

Education campaigns are always more effective when the audience is segmented and targeted with resources that are most appropriate. The adult population in Nova Scotia is not a homogenous group, and many factors have to be considered; for example age, socio economic status, geography, literacy and other factors that influence the effectiveness of the educational intervention. Therefore, the Task Force recommends:

16. THE RSAC MEMBER DEPARTMENTS CONTINUE TO RESEARCH CROSSWALK SAFETY AND CONDUCT PILOT PROJECTS FOR CROSSWALK SAFETY EDUCATION FOR ADULTS WHERE PROMISING PRACTICES EXIST.

Education for drivers is a well-established part of the initial licensing process, but there is little attention paid to education or social marketing strategies that help maintain the good practices expected after a person begins driving. Nova Scotia is already moving forward with changes to the Graduated Drivers License process (GDL). The province will strengthen the GDL process, requiring a longer period of supervision for new drivers. More attention should be given to social marketing strategies that reinforce safe behaviours of all drivers after they receive their license.

It is worth mentioning again that some factors that may compromise safety in the crosswalk for drivers may or may not be modifiable, for example, the health of the driver where hearing, vision, cognitive function and response time may be affected. In these cases, the Registry of Motor Vehicles may play a role in evaluating the competency of the driver. Drivers and pedestrians should be aware of the role of the Registry and their right to report unsafe driving that may be related to the competency of the driver. In the case of pedestrians where health issues may compromise safety in the crosswalk there is, perhaps, a greater need for primary care providers as well as family members and friends connected to a person who may be having health problems, to pay more attention to this issue.[xxxviii]

Road conditions are another factor to consider for both drivers and pedestrians. Drivers must understand how weather, road conditions, and lighting, can affect driving. The posted speed limit, for example, may be too fast given the road and weather conditions, impairing the ability to stop safely for pedestrians in a crosswalk. Pedestrians should also recognize their greater risk when conditions are not ideal.

One of the ways to address many issues relating to crosswalk safety is to have a formal road safety strategy that tackles many areas of driver behaviour that increase the risk of a collision in a crosswalk; and also better identify the responsibilities of pedestrians when they cross a road. Not to be forgotten is the desire to have more active transportation opportunities for Nova Scotians, and how that fits into crosswalk safety.

It was also identified, and discussed earlier in the Report, that youth are particularly vulnerable as both drivers and pedestrians. Changes to the GDL process should reduce the risk of all crashes by new young drivers, but there may be additional education opportunities to research and pilot that would benefit new drivers who are youth. Therefore, the Task Force recommends:

17. SNSMR AND TIR SHOULD EXAMINE EXISTING EDUCATION RESOURCES FOR NEW DRIVERS, PARTICULARLY YOUTH, AROUND AREAS OF DRIVER BEHAVIOUR THAT RELATE TO PEDESTRIAN SAFETY.

The Task Force also stresses the importance of continuing driver education throughout the lifespan. Drivers are encouraged to take advantage of every opportunity to enhance and maintain their driving skills. Remaining current with new rules of the road and road safety practices benefits all Nova Scotians.

The Registrar of Motor Vehicles has a significant role in educating both new and licensed drivers. The Registrar and SNSMR are responsible for developing the standards for driving school curriculum. Therefore, the Task Force recommends:

18. **SNSMR ENSURE DRIVING SCHOOL INSTRUCTORS ARE KNOWLEDGEABLE ABOUT CROSSWALK SAFETY, AND THAT IT BE MADE A MANDATORY COMPONENT OF THEIR CLASSROOM CURRICULUM AND IN THEIR IN-VEHICLE INSTRUCTION.**

To ensure driving schools include crosswalk safety in their instruction, SNSMR must include this in their audits of the driving school programs and verify that the information on crosswalk safety is current and accurate.

The ability to keep Nova Scotians current in their knowledge of road safety rules is imperative. The technological advances of the internet is one way of distributing information in a timely manner. The Task Force recognizes the advantages of departmental websites and suggests information related to crosswalk safety, as well as other driver and pedestrian behaviours (i.e consequences of speeding and distraction), be available on departmental websites or on a website devoted to road safety.

THE ROLE OF ENFORCEMENT IN CROSSWALK SAFETY

Traffic laws outline expected compliance with a particular signal, sign, and roadway design. It is the role of law enforcement officers and the judicial system to enforce the rules of the road. Law enforcement officers work from the "assumption that not all road users will adhere to the specified traffic rules and regulations, and may need to be encouraged, educated, and persuaded to do so."[lxxxix] To this end law enforcement officers have the dual responsibility of being educators and enforcers.[xc]

TRAFFIC ENFORCEMENT IN NOVA SCOTIA

Traffic enforcement in Nova Scotia is the responsibility of the provincial police service (RCMP) and twelve municipal police agencies. The integration of these agencies is imperative to ensure that traffic safety is enforced in a consistent and cohesive manner. The Task Force was fortunate to have two law enforcement officers as members as well as presentations from Prosecution Services, a law enforcement officer from HRP, and TIR's Senior Solicitor from the Department of Justice, to gain information on the current situation in Nova Scotia.

The Task Force identified many strengths and improvement opportunities for Traffic Services Divisions in Nova Scotia. It was also able to gain an understanding of the difficult and complex role of frontline law enforcement officers. Traffic Services law enforcement officers are educators, policing and enforcement agents, and subject matter experts for the Crown.[xci] The frontline officer is responsible for knowing, understanding, and enforcing the MVA and the Criminal Code of Canada (CCC) with regard to motor vehicle use.

Crosswalk safety is acknowledged as a priority within a larger road safety context. Law enforcement officers also regard the matter of crosswalk safety as one component of road safety that is greatly influenced by impaired driving, speeding, and driver distractions. Law enforcement officers are the most visible reminder of road safety initatives and are often able to influence both public opinion, behaviour, and policy.[xcii]

While crosswalk rules are obviously enforced throughout the year in Nova Scotia, this enforcement is often coupled with public awareness campaigns during September as children, youth, and adults return to the routine of work and school, and throughout the winter to concentrate on winter safety. Often police agencies will concentrate their enforcement efforts on high volume areas such as busy interesections and school zones. It is in these locations where most of the violations occur; therefore, it is the best use of human and technological resources.

Within HRM, Traffic & Right of Way Services staff and Police Integrated Traffic Services Unit meet regularly to discuss traffic-related safety issues and address them through a coordinated approach of education, enforcement and engineering. A primary focus of education and information campaign efforts has been crosswalk safety and it continues to be an ongoing program.

HRM's Police Integrated Traffic Services Unit has run several month-long crosswalk safety campaigns comprised of monitoring problem locations, busy intersections, school, university and hospital areas for crosswalk and speeding violations. Law enforcement officers set up checkpoints during which they distribute traffic safety literature related to crosswalks while addressing violations.[xciii]

Throughout Nova Scotia, law enforcement officers apply conventional methods of enforcement including moving and hand held radar enforcement, police check points, and random stops of vehicle operators. The responsibilities of Traffic Services Divisions in Nova Scotia is vast, the proficient use of human and material resources in conventional enforcement is essential. The law enforcement community do not have the most current technology available for processing violations, such as electronic summary offence tickets (E-SOT). At present the only law enforcement officers that utilize this technology are HRM By-law enforcement officers.[xciv] In addition to processing a violation there is the requirement to accurately complete incident reports. Time restraints and resource limitations are a challenge for Nova Scotia law enforcement officers and this has been identified as a concern by the Task Force, not only because of its effects on crosswalk safety, but on road safety in general.

Through Task Force deliberations and presentions, enforcement concerns regarding crosswalk safety in Nova Scotia were identified. As was discussed in the *Interim Report* and within this Report, the current legislation governing crosswalk safety needs to be enhanced to clearly identify the roles and responsibilities of drivers and pedestrians. Law enforcement officers need to have clear direction in order to enforce the law in a consequential way. They also need the legislative authority to enable them to use emerging technology and other tools effectively. The Task Force proposed formal legislative recommendations to this effect in the *Interim Report* and further within this Report.[xcv]

However, from an educational stand point, law enforcement officers who were asked for their knowledge stated that there were two threats 1) speeding and 2) driver and pedestrian distraction.

TRAFFIC POLICING METHODS

Road safety literature specific to enforcement often refers to three policing methods, "[f]irstly, by deterring unsafe road user behaviour, secondly, by educating the public to adopt safer road user behaviour and lastly, by punishing, when necessary, those road users who breach traffic laws."[xcvi] These methods cannot be conducted in isolation and require the support of other road safety partners in order to be successful.

The need for collaboration among road safety agencies was identified early in the work of the Task Force. Collaboration facilitates information gathering and sharing and collective problem solving. While RSAC has an important role to play in road safety, it is important that law enforcement agencies and officers are able to work together to address these issues. Currently, the Nova Scotia Traffic Forum (Traffic Forum)[19] is the mechanism for RCMP and municipal law enforcement officers to discuss traffic matters and solutions. The Traffic Forum occurs throughout the year. While this is a very effective mechanism to explore road safety in the province, further conversations with law enforcement officers identified a need to build upon the existing Traffic Forum.

Discussions within the Task Force suggest that traffic related matter shared within the Traffic Forum may not be reaching front-line law enforcement officers. A strategy must be developed to enhance front-line law enforcement officer knowledge of the Traffic Forum and facilitate additional discussions around a common enforcement strategy, and dissemination of those meeting discussions to the greater law enforcement community, by way of a communications strategy. The Traffic Forum should be reflective of provincial police service (RCMP) districts (Northeast Nova, Southwest Nova and HRM), RCMP Traffic Services and Municipal Police Agency representation throughout the province.

Discussions within the Task Force determined that both the Department of Justice and TIR have designated road safety personnel, responsible for road safety matters within their own departments. Although it is apparent these individuals work closely within RSAC to enhance road safety, there is no single individual or department identified to coordinate and communicate road safety information to the law enforcement community.

The individual identified to coordinate these activities would enable consistency in information gathering and transference. This individual would be instrumental in contacting and participating in the Traffic Authorities meetings; and acting as a conduit between the law enforcement officers and traffic authorities. Coordination and communication among these groups enhances crosswalk

[19] The Nova Scotia Traffic Forum is composed of a Policing Consultant - Department of Justice, Deputy Registrar of Motor Vehicles - Service Nova Scotia and Municipal Relations, Injury Prevention Coordinator - Health Promotion and Protection, RSAC Coordinator - TIR, Public Prosecution Service, Halifax Regional Police Traffic Division, RCMP Traffic Services, Cape Breton Regional Traffic Services, New Glasgow Police Service, Department of National Defence Military Police, HRM/RCMP Integrated Court Section.

and road safety, because all parties will be current in their knowledge of legislation, case laws, and engineering and enforcement strategies.

Therefore, the Task Force recommends:

19. THE PROVINCIAL POLICE SERVICE (RCMP) TRAFFIC SERVICES DIVISION AND MUNICIPAL POLICE AGENCIES, ARE ENCOURAGED TO MEET ON A REGULAR BASIS TO DISCUSS TRAFFIC ENFORCEMENT MATTERS; ENSURING FRONT-LINE LAW ENFORCEMENT OFFICERS ARE REPRESENTED.

20. THE PROVINCE IS ENCOURAGED TO IDENTIFY A DEPARTMENT AND ASSIGN AN INDIVIDUAL RESPONSIBLE FOR COORDINATING TRAFFIC SERVICE DIVISION FORUMS AND MAINTAINING REGULAR COMMUNICATION WITH LAW ENFORCEMENT OFFICERS REGARDING ROAD SAFETY MATTERS, INCLUDING PEDESTRIAN AND CROSSWALK SAFETY.

The *Mid-Term Review Report* discusses how essential it is for road safety agencies to strengthen their relationships with one another and allocate their collective resources to reduce motor vehicle collisions. It is not enough to recognize law enforcement officers as partners in road safety; it is essential to publically support and provide them with the necessary resources – legislative, educational, human, and financial. Using this approach to traffic enforcement validates road safety as an important issue that requires attention.[xcvii]

Literature often states that traffic enforcement "consists of three step-wise components including legislation, traffic policing[,] and legal sanctions",[xcviii] that affect road user behaviour and public opinion, ultimately reducing motor vehicle collisions.

LEGISLATION

In addition to the legislative recommendations proposed in the *Interim Report*, the Task Force was informed that other amendments to the MVA Regulations are required to enhance the authority of law enforcement officers. The Task Force is advancing these legislative recommendations as a means to assist law enforcement officers with the legislative support they require.

Firstly, Nova Scotian vehicles are only required to have a rear license plate, making it difficult for law enforcement officers, and the public, to safely and quickly identify and report offenders. Secondly, under the current MVA Regulations, a Summary Offence Ticket (SOT) cannot be issued based on license plate identification alone. In many cases, when a driver fails to yield to a pedestrian or violates the MVA in some other way, the witness or officer is unable to identify the driver making conviction nearly impossible, as the Crown, through witnesses, cannot prove who was driving at the time of the offence. Legislation to enable law enforcement officers to issue a SOT based on the license plate alone, is required.

Therefore, the Task Force recommends:

21. THE DEPARTMENTS OF TRANSPORTATION AND INFRASTRUCTURE RENEWAL (TIR), SERVICE NOVA SCOTIA AND MUNICIPAL RELATIONS (SNSMR), AND JUSTICE (DOJ) SHOULD EXPLORE AND TAKE ANY OPPORTUNITIES TO ENHANCE AND CLARIFY THE MVA TO ENABLE LAW ENFORCEMENT OFFICERS TO ENFORCE THE ACT EFFECTIVELY AND EFFICIENTLY. THE TASK FORCE IS ADVANCING TWO AREAS OF PRIORITY:

    A. TIR AND SNSMR SHOULD JOINTLY PURSUE AMENDMENTS TO LEGISLATION AND REGULATIONS TO REINTRODUCE ALL VEHICLES (PERSONAL AND COMMERCIAL) TO REQUIRE BOTH FRONT AND REAR LICENSE PLATE.

    B. TIR AND DOJ SHOULD JOINTLY PURSUE AMENDMENTS TO LEGISLATION AND REGULATIONS TO ENABLE LAW ENFORCEMENT OFFICERS TO ISSUE SUMMARY OFFENCE TICKETS BASED ON LICENSE PLATE IDENTIFICATION ALONE.

In addition to the above-proposed legislation, discussions in Task Force meetings identified the need to be able to capture pedestrian collisions with accuracy and expediency. Currently law enforcement officers with HRP's parking enforcement are the only unit to have access to electronic summary offence tickets (E-SOT). The E-SOT improves accuracy of information as law enforcement officers are able to use these devices rather than rely on handwritten citations. The efficiency of E-SOT allows law enforcement officers to issue a ticket quickly returning them to their other duties sooner.

Therefore, the Task Force recommends:

22. TIR, DOJ, AND SNSMR EXPLORE THE FEASIBILITY OF AMENDING LEGISLATION AND REGULATIONS TO PROVIDE LEGISLATIVE AUTHORITY FOR ELECTRONIC SUMMARY OFFENCE TICKETS (E-SOT).

The literature on traffic enforcement underscores the importance of providing police agencies with automated enforcement devices. These devices enhance accuracy, improving the prosecution of offences. This expediency of being able to fine, charge, and prosecute offenders – regardless of the type of offence such as speeding, failing to yield, and impaired driving – deters these types of behaviours. Most illegal road user behaviour continues, because prosecution of these offences can be slow and the penalty may not be proportional to the offence. The Task Force discussed the potential of red light cameras and photo radar to improve crosswalk safety. These devices reduce the instances of drivers running red lights, improve driver behaviours at signalized intersections, and increase compliance rates.[xcix]

There have not been any sources directly linking these devices to improved crosswalk safety. However, as these devices target behaviours such as speeding and other illegal road user behaviour it is safe to assume these devices will enhance crosswalk safety. Many countries and

provinces are relying on these devices to enforce road safety, as they are effective in deterring unsafe driver behaviours. Crosswalk safety would likely benefit as a result.[c]

TRAFFIC POLICING

The legislative recommendations in the *Interim Report* enhance law enforcement officers' ability to interpret the MVA effectively. Enacting these pieces of legislation will also increase public awareness of the importance of road safety.

Increasing the visibility of road safety matters, such as crosswalk safety, acts as a deterrent to inappropriate road user behaviour. The majority of enforcement countermeasures are founded on what is known as the "deterrence theory". Deterrence can be both general and specific.

General deterrence requires an increased police presence, coupled with public awareness campaigns to make road users aware of the consequences of their actions.[ci]

Specific deterrence refers to the individual consequences of violating a law within the MVA or CCC. In this situation, it involves the investigating officer(s), the offender, and possibly the judicial system. Specific deterrence articulates to the individual the specific penalty of offending and the consequences of re-offending.[cii]

The majority of enforcement resources are often dedicated towards general deterrence. Both theories work on the assumption that drivers and pedestrians are able to make logical decisions and to choose to obey the law or not.[ciii]

General deterrence is more than increasing police presence, it involves devising strategies to effect changed driver and pedestrian behaviour. Most strategies involve identifying the type and frequency of enforcement. Effective enforcement is expensive and requires careful planning and use of resources to maximize the affect of a particular strategy.[civ] To this end, the Task Force researched and discussed some of the other challenges confronting law enforcement officers when addressing crosswalk safety.

The Task Force learned that speeding was a large concern for the enforcement community. Law enforcement officers identified that in their experience speeding was often a factor in most of the pedestrian collisions they attended. The Task Force believes if more resources were provided to law enforcement officers to target speeding, there would be a reduction in pedestrian collisions.

Therefore, the Task Force recommends:

23. THE RCMP AND MUNICIPAL POLICE AGENCIES PUBLICLY AND FORMALLY IDENTIFY SPEEDING AS A PUBLIC SAFETY PRIORITY AND EXPLORE METHODS OF ENHANCING THEIR ENFORCEMENT EFFORTS.

Formally recognizing speeding as a priority clearly identifies the need for resources to be committed towards developing a strategy to reduce the incidents of speeding. Therefore, the Task Force recommends:

24. SPEEDING COUNTERMEASURES SHOULD BE DEVELOPED AND INCLUDE PUBLIC AWARENESS CAMPAIGNS COMBINED WITH CONCENTRATED ENFORCEMENT OF SPEEDING WITH THE OBJECTIVE OF REDUCING THE AVERAGE TRAVELING SPEED, INCIDENTS OF SPEEDING, AND ZERO TOLERANCE FOR SPEEDING IN SCHOOL ZONES.

Targeting speeding would require the development of a speeding countermeasures strategy. This requires an increase in surveillance levels through the allocation of law enforcement officers and equipment in the most efficient and effective manner.[cv] Often this requires using what is referred to as "selective strategies"; which are "designed to specifically target high risk road user behaviour and traffic [collision] locations"[cvi]

To implement a successful enforcement strategy for crosswalk safety, police agencies must have reliable data to allocate resources effectively. Without reliable collision data, police agencies cannot maximize the resources available to them. To sustain any strategy, police agencies must maximize their resources in various ways. The level of staffing available is one of the most significant factors to assure success of a strategy.[cvii] Human resource vacancies in Traffic Services Divisions have a serious impact on traffic safety enforcement, including crosswalk safety.

Therefore, the Task Force recommends:

25. THE PROVINCE AND MUNICIPALITIES IDENTIFY THE STAFFING OF TRAFFIC SERVICES POSITION VACANCIES AS A PROVINCIAL ROAD SAFETY PRIORITY.

Identifying locations and allocating resources requires reliable and accurate information to make such decisions. The "Nova Scotia Pedestrian Collisions Statistics", section of this Report stressed the importance of quality data. This is particularly important for enforcement. Currently, in Nova Scotia, some police agencies do collect this data and use it for resource allocation. There has not been a review of this information by the Task Force so it is unable to make an informed judgement on the quality. However, it confirms the importance for law enforcement officers to complete pedestrian collision reports as accurately as possible.[cviii]

Selective enforcement strategies require data that can provide all collision factors such as location, time of day, typical road user behaviour, and the number of collisions for that location. This

information must be able to afford the ability to prioritize the locations and the factors. Without being able to do this, police agencies are unable to dedicate resources appropriately to address the situation.[cix]

Research into selective enforcement strategies has proven to be very effective as the increase in police presence acts as a deterrent at key locations. Unsafe road user behaviour is reduced and so too is the number of collisions.[cx]

The Task Force therefore recommends:

26. THE RCMP AND MUNICIPAL POLICE AGENCIES COMMUNICATE TO FRONTLINE LAW ENFORCEMENT OFFICERS THE IMPORTANCE OF COMPLETING PEDESTRIAN COLLISION REPORTS IN AN ACCURATE AND TIMELY MANNER.

The accuracy and timely completion of pedestrian collision reports is crucial to the collection and analysis of quality data.

ENFORCEMENT & EDUCATION

The importance of education and the method of teaching are critical to influencing road user behaviour. The role of law enforcement officers in education was one of debate in the Task Force meetings. The literature review and additional research demonstrated conflicting opinions on what role law enforcement officers were to assume in traffic and crosswalk safety education.[cxi]

In Nova Scotia, the role of law enforcement officers in educating students within the school system varies across the province. Halifax Regional Police (HRP) has a structured traffic education program and law enforcement officers are invited to schools to discuss these subjects with students. HRP officers may participate in education sessions at schools as part of their role or officers may volunteer their time. Similar programs and initiatives exist in rural Nova Scotia. Many RCMP and Municipal Police Agencies in the province; however, do not have sufficiently trained resources to be consistent, and most effective in these classroom sessions. Discussions within the Task Force suggested RCMP and Municipal Police Agencies in rural Nova Scotia consider the role of their School Liaison Officer as one of a coordinator, utilizing alternative organizations (i.e. Red Cross, Nova Scotia Safety Council, etc.) as subject matter experts to assist with educating children about road and crosswalk safety.[cxii]

In their presentation to the Task Force the Department of Education confirmed the role of law enforcement officers as road safety educators varies throughout the province. Not all schools and teachers found guest speakers to be effective in teaching road and crosswalk safety.[cxiii]

Due to the conflicting research and in the interest of recognizing RCMP and Municipal Police Agencies' resource restraints and existing programs; the Task Force recommends:

27. THE RCMP AND MUNICIPAL POLICE AGENCIES REVIEW THE ROLE OF THEIR SCHOOL LIAISON OFFICERS IN TRAFFIC AND CROSSWALK SAFETY EDUCATION TO DETERMINE THE MOST EFFICIENT USE OF THEIR ABILITIES AND TIME.

The role of school liaison officers is an important one; therefore, defining their responsibilities within policing agencies is necessary.

The opportunities for crosswalk education do not end in the classroom. Law enforcement officers have a role to play in educating the public about road and crosswalk safety. In order to fulfill this commitment to public education, law enforcement officers must be granted every opportunity for professional development to learn about changes to legislation, case law, effective methods of educating the public and enforcing road safety.

In HRM, the Police Integrated Traffic Services Unit operates two formal month-long Crosswalk Safety campaigns comprised of monitoring problem locations, busy intersections, school, university and hospital areas for crosswalk and speeding violations. Law enforcement officers set up checkpoints during which they distribute traffic safety literature related to crosswalks while addressing violations.

The Task Force found jurisdictions in the US and Australia, which developed comprehensive reference manuals to assist law enforcement officers in enforcing pedestrian and bicycle laws. Information specific to pedestrian and driver behaviours and laws is readily available to law enforcement officers in user-friendly manuals. These manuals include the laws, methods of enforcement specific to pedestrians and drivers, and common driver and pedestrian behaviours. The manuals combined with professional development opportunities have assisted in successful enforcement of pedestrian laws. This type of education directed at law enforcement officers assists with the ability to develop more proactive measures to enforce pedestrian laws. Combine this with clear legislation and the promise of better prosecution of these offences, when necessary, increases the confidence of law enforcement officers in the law and their ability to enforce the laws.[cxiv]

HRP have an offence manual that is authored and updated by a fellow officer. This manual is not formally available to law enforcement officers outside HRM. The Task Force discussed the lack of readily available information on crosswalk and speeding legislation, and SOT to law enforcement officers. The Task Force recognizes that consolidating legislation and penalties pertaining to the MVA into a manual would be extremely beneficial. The manual itself would not be enough, professional development opportunities and communication to frontline law enforcement officers would be required.

Continuing professional development of law enforcement officers is important as it can provide them with the necessary information they need to enforce crosswalk laws and provide education to the public. Maryland's Highway Safety Office underscored the importance of public education by law enforcement officers stating:

- *Un-enforced laws will be ignored*
- *Enforcement gives credibility to engineering and education interventions*
- *[Enforcement] increases driver awareness*
- *[Enforcement] increases compliance and saves lives*
- *[Enforcement] enhances "walkability" of communities* [cxv]

Some of the research materials encouraged law enforcement officers to use verbal warnings and information pamphlets as one way to educate the public. This combination of enforcement and education assist with changing the public's attitudes and behaviours towards crosswalk safety. This type of education is an opportunity for law enforcement officers to engage with pedestrians, drivers, and community members. [cxvi] "[A]s a result of an internalisation of the rules"[cxvii] people begin to change their attitude towards road safety resulting in changed behaviour.

Therefore, the Task Force recommends:

28. POLICING AGENCIES MUST EXPLORE THE FEASIBILITY OF PUBLISHING A REFERENCE MANUAL THAT CONSOLIDATES ALL SPEEDING AND CROSSWALK VIOLATIONS.

The reference manual would be readily available to expedite law enforcement officers' ability to issue a SOT at the scene. The reference manual must remain current in order to be relevant and effective.

With the right materials available, law enforcement officers, as educators, are able to develop a culture of shared responsibility between pedestrians and drivers to share the road.[cxviii]

ENFORCEMENT & PENALTIES

Literature has "indicated that the two most common approaches to traffic policing are: the enforcement of traffic laws and regulations; and the education of road users as to best practice."[cxix] Enforcing traffic laws often involve a penalty that can range from a warning to issuing a SOT. The combination of enforcement and penalty affects the public's opinions of road and crosswalk safety and their behaviour.[cxx]

Enforcement strategies regarding road safety assume people are able to choose to break the law. However, most road users may be unaware of the laws or that they have committed an offence due to distraction or not fully understanding the laws and the severity of the consequences of an offence. Education is one tool to combat this, but so is the type of penalty. Studies have "argued that there may be greater merit and fairness of punishment in issuing a warning to these offenders [minor offenders] and issuing more severe penalties to those road users who blatantly breach traffic laws[cxxi] It is the balance between the two that can be confusing for people.

The Task Force received many letters and submissions stating that penalties were not harsh enough to deter people from ignoring or breaking crosswalk laws. The following chart provides an outline of the collision investigation process in Nova Scotia. Anyone involved in a collision, pedestrian or driver, has a legal obligation to report all collisions with property damage of $1,000 or more and/or collisions that have resulted in bodily injury or death of any person involved in the collision.[cxxii]

Table 5: Pedestrian-Motor Vehicle Collision Investigations

Extent of Injuries	Police Presence	Type of Action
Minor injuries	Police not contacted	No police action
	Police not on scene but report filed later.	Police investigate, statements, photographs. Charges laid if deemed warranted after investigation complete.
Serious injuries	Police on scene	Investigation started, measurements, photographs, statements from witnesses & those involved. Investigation dictates what charges are laid & on whom. If there are questions Crown Prosecutor consulted.
Fatality	Police on scene	Investigation started. Measurements, statements from witnesses & anyone involved, photographs & vehicle involved in collision will have a mechanical inspection done on it. Once investigation is complete a Crown Prosecutor will be consulted with regard to the charges.
The investigation dictates the charges laid, which is either the MVA or the CCC.		

The severity of the penalty for an offence is dictated by the legislation, the investigation, and the professional judgement of law enforcement officers.

The *Interim Report* stressed the importance of clear and solid legislation to support law enforcement officers to impose the rules of the road. The Task Force has forwarded several legislative changes to enable law enforcement officers to enforce crosswalk laws. In Nova Scotia, motor vehicle offences are subject to the MVA and the CCC. Which piece of legislation a road user is subject to depends fundamentally on intent. If an investigation suggests an individual purposefully hit a pedestrian in a crosswalk, and if there is evidence to prove this, the Crown may charge the driver under the CCC. If no evidence of intent exists, then a charge under the MVA may be issued to the pedestrian or driver.

DISCRETIONARY AUTHORITY OF THE REGISTRAR

It is not widely known that the Registrar of Motor Vehicles has the authority to investigate and take action in a number of scenarios where driver competence and road safety is in question. The Registrar will review the driver's abstract to determine if discretionary authority is required. The MVA states, the Registrar has the authority to order a driver to undergo a medical examination, take a defensive driving course and/or complete a re-examination.[cxxiii]

The Registrar's authority extends to the capacity to suspend a driver's license or the privilege of obtaining a driver's license if the Registrar has reason to believe a person:

- has committed an offense that would result in mandatory revocation;
- has, by reckless or unlawful driving, caused or contributed to an accident that resulted in death or injury or in serious property damage;
- is incompetent to drive or has mental or physical disabilities that cause them to drive unsafely;
- is a habitual reckless or negligent driver, or has committed a serious violation of the MVA or of the provisions of the CCC relating to motor vehicles;
- has operated a vehicle while the vehicle was being used for unlawful purposes;
- is a habitual violator of the provisions of the MVA or its Regulations.

Considering the circumstances described above, it is evident why the Registrar would want law enforcement officers and the public to quickly report (in writing) drivers involved in pedestrian collisions. Law enforcement officers can send their primary reports directly to the Registrar requesting the review of a driver when they want to bring a particular incident to the attention of the Registrar. Law enforcement officers can send a notification when a driver is fully or partially responsible for an incident, without laying a charge(s). Sending these reports to the Registrar early improves road safety, because the Registrar has the information required to take the appropriate action. This is in addition to any other reporting that is required under the MVA.

Members of the public can also notify the Registrar of Motor Vehicles in writing of incidents involving drivers where there is a concern for road safety. These notifications must contain all the information related to the driver and the related incident.[20]

The role of enforcement in crosswalk safety is instrumental as it can be viewed as the lynch pin between engineering and education. Law enforcement officers bring credibility to engineering by enforcing the rules of the road dictated by engineering standards and guidelines. Law enforcement

[20]For more information about this process or to send a report, the contact information is: Driver Licensing, Registry of Motor Vehicles, Maritime Centre, 9 North, 1505 Barrington St. Halifax, NS, B3J 3K5; fax 424-0772. Please note that anonymous reports and reports by phone are not accepted.

officers also reinforce education introduced through the school system and public awareness campaigns through their enforcement methods. Most people consider law enforcement officers as the most visible component of road safety; relying on them when other measures cannot effect changed road user behaviour. "The use of enforcement can be an effective means of modifying road user behaviour and reducing road [collisions]." [CXXIV]

The Task Force acknowledges and values the crucial role of law enforcement officers in crosswalk safety and therefore recommends:

29. THE GOVERNMENT, RCMP, AND MUNICIPAL POLICE AGENCIES MUST DEDICATE FUNDING TOWARDS TRAFFIC ENFORCEMENT TO PROMOTE, EDUCATE, AND ENFORCE TRAFFIC AND CROSSWALK SAFETY EFFECTIVELY.

THE ROLE OF EVALUATION IN CROSSWALK SAFETY

Some road and crosswalk safety stakeholders consider evaluation the fourth "E" alongside engineering, education, and enforcement. Evaluation is essential to determine the strengths and weaknesses of a safety strategy and if it is achieving its intended objective. Despite the importance road safety stakeholders put on evaluation, evaluations are rarely completed. There are challenges to conducting evaluations, specifically regarding the collection of accurate, reliable, and timely data and information.

DATA AND CROSSWALK SAFETY

In the process of examining crosswalk safety, it became clear that in all areas of concern - engineering, enforcement and education - that there has been a lack of rigorous evaluation in the range of strategies used to increase safety.

The comprehensive data required to conduct an evaluation is difficult to obtain and analyze. The data currently available is valuable, for example, it enabled the identification of target audiences requiring education and factors that require further exploration.[21]

Evaluation is a critical element in the development and implementation of programs and initiatives designed to increase the safety of crosswalks.

Ongoing surveillance and improvement of data collection is a critical part of improving crosswalk safety. It is essential to evaluation, and essential to helping understand the groups most at risk for injury in crosswalks.

The Task Force recommends:

30. **RSAC MEMBER DEPARTMENTS AND RELEVANT AGENCIES IMPROVE THEIR SYSTEMS AND PROCESSES TO COLLECT, ANALYSE, AND SHARE THE DATA CRITICAL TO UNDERSTAND AND ADDRESS CROSSWALK SAFETY.**

> "a 'rear view mirror' approach to road safety appears to be characteristic of much road safety in Canada... . Early identification of trends is essential to enable ...timely and effective advice about the evaluation of interventions and policies."
>
> *Mid-Term Review Report, pg. 33*

[21] For a discussion on the importance of quality data collection and analysis, see "Nova Scotia Pedestrian Collision Statistics" of this Report, pages 23-37.

One of the harshest criticisms the *Mid-Term Review Report* had of the majority of the provinces and territories was the delay in reporting collision information. The timeliness of data is essential to responding quickly and correctly to road safety matters like crosswalk safety. Moreover, it is essential for monitoring trends and conducting evaluations.

ACCOUNTABILITY & CROSSWALK SAFETY

The literature review, additional research, and presentations exposed conflicting best practice information regarding crosswalk safety in engineering, education, and enforcement. The conflicting information combined with inconclusive pedestrian collisions statistics demonstrates the importance of evaluation. The lack of a thorough review of the implementation status of the recommendations of the *Pedestrian Safety Task Force Report (1990)* also proves the need to conduct evaluations. Only through evaluation can it be determined if interventions are achieving their intended objectives and if government is meeting its commitment to crosswalk safety.

It was difficult for the Task Force to determine what recommendations from the *Pedestrian Safety Task Force Report (1990)* were implemented. However, implementation of a recommendation cannot be the only determinant of accountability to a task force's recommendations. For example, the *Pedestrian Safety Task Force Report (1990)* recommended the expansion of traffic safety programs delivered by Safety Education Officers. Government did not adopt this recommendation; in fact, they discontinued the program. At first, it appears to be a mistake to have done this; however, without a formal evaluation demonstrating the program was effective, the only conclusion is the need for crosswalk safety education.[22]

Conflicting information regarding crosswalk safety best practices presents a need and opportunity for Nova Scotia to develop its own strategies. However, in the absence of clear best practices in some areas of crosswalk safety there needs to be an effort to follow-up and properly evaluate many of the promising practices that can be used as part of an overall crosswalk safety strategy.

Surveillance and evaluation determines how well a program or elements of a program are doing and areas for improvement.

Many recommendations included in this Report have financial implications and evaluation is a necessary part of accountability to ensure resources are used wisely.

[22] For a discussion on the importance of effective educational materials and approaches see, "The Role of Education in Crosswalk Safety" of this Report, pages 51-61.

While piloting some initiatives on a small scale may be frustrating for some affected by a crosswalk tragedy – it is important to know if a new program is serving the target population as planned, and is producing the desired outcome. Therefore, the Task Force recommends:

31. RSAC ENSURE FORMAL EVALUATIONS OF PROGRAMS, POLICES, AND STRATEGIES RELATED TO CROSSWALK SAFETY ARE CONDUCTED.

32. RSAC ENSURE AN ANNUAL REPORT REGARDING THE IMPLEMENTATION STATUS OF THE RECOMMENDATIONS IS RELEASED TO THE PUBLIC; AND AFTER FIVE YEARS, A FORMAL REVIEW OF CROSSWALK SAFETY PROGRAMS, POLICIES, AND STRATEGIES IS CONDUCTED.

The Task Force encourages government to adopt an evaluation-based mindset by designing evaluation frameworks as part of program development and implementation. Evaluation frameworks require reliable and accurate data collection and surveillance that monitors performance and manages risk. Surveillance information facilitates the ability to "monitor, evaluate and report on the results throughout the lifecycle of a program, policy or initiative."[CXXV] An evaluation framework when included in program design:

- links resources to outcomes and objectives
- articulates the roles and responsibilities of those involved
- identifies potential issues on an ongoing bases,
- demonstrates accountability
- ensures the availability of reliable, accurate, and timely information [CXXVI]

PUBLIC SUBMISSIONS ON CROSSWALK SAFETY

The Task Force received a number of formal and informal submissions from a diverse range of perspectives and opinions. The comments, suggestions, and requests provided were thoughtful, heartfelt, informative, and insightful.

The following is a summary of the feedback received and highlights a number of themes. This section provides analysis of the feedback using the literature review, additional research and presentations. The section advances some recommendations.

The following is an overview of the themes organized under the following sections:

- Engineering
- Education
- Enforcement

ENGINEERING

In addition to issues brought to the table by Task Force members or uncovered during the literature review, the Task Force received a number of suggestions for engineering changes to crosswalks. They are summarized as follows:

USE OF FLUORESCENT YELLOW-GREEN CROSSWALK SIGNS

This is a treatment that is frequently suggested by the public to reduce pedestrian collisions in crosswalks. Currently, the MUTCDC recommends that only school zones be marked with fluorescent yellow-green signs.

Studies have shown that signage can often be helpful in making crosswalks safer, however signs also have the possibility of providing a false sense of security for pedestrians – making pedestrians feel as if their behavior does not contribute to their safety, but that they are protected by posted signs or lines painted on the road. Research has indicated that yield to pedestrian signs are effective in reductions in pedestrian/motor vehicle conflicts at multilane crosswalks when placed in advance of a crosswalk.[cxxvii]

In 2003, a study was conducted comparing traditional white and black pedestrian crossing signs to the same signs with a fluorescent yellow-green background. The research showed that regardless of the yellow-green signs as being rated more conspicuous in human factor studies, they did not

have any effect on the percentage of motorists who yielded to the crosswalk at a further distance.[cxxviii]

When florescent yellow green sign sheeting material was introduced, the Traffic Operations and Management Standing Committee (TOMSC) decided to reserve this unique colour for signs marking a school area. During its review, TOMSC determined it would be best to create a unique identifier for school zone signing, thus heightening the awareness of motorists to the fact that they were entering an area where children may be present on the highway. The Task Force views the expansion of the use of florescent yellow green sheeting as detracting from school area safety while at the same time evidence would indicate that fluorescent yellow green signs will not result in increased driver compliance and reduced crosswalk collisions.

The Task Force recommends:

33. A. **THE PROVINCE AND MUNICIPALITIES MUST REMAIN CONSISTENT WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES FOR CANADA (MUTCDC) AND INSTALL CROSSWALK TREATMENTS ACCORDING TO MUTCDC PRACTICES.**

B. **MUNICIPALITIES IN NOVA SCOTIA USING SIGNS OTHER THAN THOSE PRESCRIBED BY THE MUTCDC FOR CROSSWALKS SHOULD CHANGE THOSE SIGNS TO CONFORM TO THE MANUAL.**

RED FLASHING LIGHTS AT CROSSWALKS

There have been requests from the public that asked for pedestrian activated overhead flashing beacons be changed from the existing amber to red. The concept is that red lights will be more visible and also that drivers are conditioned to stop when they see a red light.

Pedestrian activated flashing amber beacons are a step up from the basic crosswalk installation in the hierarchy of crosswalk treatments. They are used on multi-lane approaches where speeds are high or where there is a significant collision history and other treatments have not helped. The intended action is that before crossing, the pedestrian activates the beacons and waits for drivers to yield. Once satisfied that drivers have yielded, the pedestrian may cross the highway.

> "[P]edestrians who must wait for an excessive amount of time to cross a street (some studies have found that more than 30 seconds is too long) may walk against a pedestrian signal or cross at another location."
>
> FHWA, *Pedestrian Road Safety Audit Guidelines & Prompt Lists*

The pedestrian activated beacon system is timed to flash the beacons for a predetermined amount of time, based on the width of the road and a lower than average walking speed of pedestrians (including elderly people and children). These beacons, programmed for a lower than average walking speed, may continue to flash after a pedestrian with a faster than average walking speed has completed their crossing.

Drivers approaching the flashing beacons are expected to slow and yield to pedestrians crossing or waiting to cross. If there are no pedestrians crossing or waiting, the driver may proceed with caution.

The MVA requires that drivers stop at a flashing red light, in a similar manner to the action taken at a stop sign. Each driver approaching this light must stop, make sure that there is nothing in the way and then proceed. If pedestrian activated beacons were red, the same sequence of events would be required. When approaching the red beacons, the driver would be expected to stop, check and then wait for any pedestrians crossing or waiting to cross, before proceeding. The next car would have to do the same – stop, check and wait, proceed – for as long as the beacons were flashing.

While this seems like a safe approach, there are some pitfalls. As mentioned before, drivers are required to come to a complete stop at a flashing red light. However, drivers need time to react, slow and then stop. This is the reason that an amber phase, usually about four seconds long, is used on regular traffic signals. It gives drivers time to react to the changing light by slowing and preparing to stop.

In order to expect drivers to react appropriately, a similar transition phase would be required if the flashing pedestrian beacons were to be red. In this case, the pedestrian would push the button to activate the system and a signal (most likely amber) would be displayed to drivers to indicate that they must prepare to stop. After a predetermined time, the signal would change to the flashing red display to inform drivers that they must now come to a complete stop. It is only at this time that pedestrians may cross.

With the addition of the amber warning signal to the red signal, this device begins to resemble a regular traffic signal. However, there is no green light and the signal remains dark until activated. This poses another problem, as drivers are trained to treat dark signals as though they are stop signs, in case the signal is darkened due to a power outage. Therefore, all drivers would be required to stop, whether there are pedestrians or not. The Task Force believes this type of signal would likely lead to rolling stops and general disregard of this signal and possibly all dark traffic signals.

In Tucson, Arizona, a signal known as a High intensity Activated crossWalK or "HAWK" is being piloted. To avoid dark signal confusion, this signal uses a unique configuration of lights with an amber signal on the bottom and two red signals, side-by-side, on top. Pedestrians approaching

the crosswalk see a "don't walk" symbol. When a pedestrian wants to cross, they activate the system by pushing a button. The signal begins to flash amber then changes to solid amber and then to single solid red. The length of time for each of these displays depends on roadway speeds. When the vehicle signal displays solid red, the pedestrian signal changes to "walk". After a time, determined by the width of the road being crossed, the pedestrian signal will start to flash the "don't walk" signal and the vehicle signal will begin to flash the two red lights alternately to indicate to driver of the stopped vehicle that they may proceed if it is safe to do so. The next vehicles in succession must then stop and only proceed when safe until the flashing red lights turn off.[cxxix]

After this level of sophistication is added to the pedestrian activated beacon as used in Nova Scotia, it begins to resemble the pedestrian activated signal (half-signal), as described earlier. The US is moving to have the "HAWK" system included in their MUTCD. The US MUTCD does not permit the use of pedestrian half-signals. It is the understanding of the Task Force that the US is concerned drivers on the side street may be confused as to how to treat the stop sign when they see traffic stopped on the main street at the red light. In spite of resistance to the half-signal in the US, Canada has already adopted the pedestrian activated half-signal into widespread use across the country. The United Kingdom (UK) also authorizes and uses half-signals. The Task Force considers the "HAWK" signal a variety of a half-signal with some problematic aspects that do not occur with Canadian half-signals and considers the current Canadian half-signal as superior to the "HAWK" signal.[cxxx]

HRM currently has five pedestrian half-signal installations in place. They are used in locations where a marked crosswalk is no more than about 200 m from a signalized intersection. The controller of a pedestrian half-signal can communicate with the controller at a nearby signalized intersection, so that the two signals can be coordinated to aid in vehicle progression and reduce driver frustration. There are no half-signal installations on roads within the province's jurisdiction.

It is important that Pedestrian Activated Beacons and pedestrian half-signals are not over-used. Instead, they should be employed in the hierarchy discussed earlier.

PURPLE OR WHITE FLASHING LIGHTS AT CROSSWALKS

Further to the suggestion of red flashing lights at crosswalks, some suggestions of using uniquely coloured flashing lights, such as purple or white, were received. While it is important to draw attention to pedestrians crossing the road, it is equally important to deliver consistent and uniform messages to drivers. For instance, flashing purple lights are used to indicate funeral processions in some other jurisdictions and are quickly becoming reserved for that purpose. To introduce purple as a means of identifying pedestrians does not send a consistent message to drivers visiting from other provinces.

White lights are used for night-time lighting and are not appropriate for signals. A flashing white light may stand out during the day, but may tend to temporarily blind a driver at night, making it more difficult to see pedestrians crossing the road.

FLASHING LIGHTS SHOULD BE AT EYE LEVEL, NOT ABOVE

The installation of flashing beacons at a crosswalk is done in accordance with the guidelines provided in the Transportation Association of Canada's *Pedestrian Crossing Control Manual*. The amber beacons are mounted each side of an Overhead Pedestrian Crossing (RA-5) Sign, which is suspended over the roadway. In order to provide clearance for tall vehicles, these signs and beacons must be mounted at least 4.3m above the roadway.

In 2003 Halifax Regional Municipality tested the efficacy of using side mounted flashing amber beacons to supplement the overhead flashing beacons. Anecdotally the side mounted beacons were well received, however a study into their effectiveness showed little change in driver yielding behaviour.

The Task Force acknowledges that the public is concerned that the amber pedestrian beacons which are currently in use are not particularly conspicuous, especially when installed in an urban environment where there are a lot of other visual distractions. However, the Task Force is not aware of any studies regarding the conspicuity of pedestrian activated beacons which prove this theory.

The pedestrian activated beacons currently follow the national standards contained in the *Pedestrian Crossing Control Manual* and the MUTCDC. That is, an internally illuminated overhead flashing beacon placed over each side of the road and equipped with pedestrian activated amber beacons which flash alternately. The amber lens must be a minimum diameter of 200 mm (8"), which is the size currently used in Nova Scotia. The MUTCDC does however indicate that a 300 mm lens yields a maximum luminance in the centre of the lens, which is two or more times higher than that of a 200 mm lens. MUTCDC goes on to say that consideration should be given to using the 300 mm lens for the following traffic signal uses:

- all arrow indications;
- for signal heads located more than 30 m from the stop line;
- all intersection approaches where drivers may be confused when both traffic control and lane control signals are viewed simultaneously;
- for specific problem locations, such as those with conflicting or competing background light;
- where engineering studies indicate a requirement for increased visibility.

With respect to pedestrian activated beacons, the Task force makes the following recommendation:

34. THE PEDESTRIAN ACTIVATED BEACONS CONTINUE TO FOLLOW THE NATIONAL STANDARD. IN AN EFFORT TO ADD CONSPICUITY TO PEDESTRIAN ACTIVATED BEACONS, MUNICIPALITIES AND THE PROVINCE SHOULD CONSIDER INTRODUCING A PROGRAM TO UPGRADE AMBER PEDESTRIAN BEACONS TO 300 MM (12") LED LENSES.

A program to upgrade amber pedestrian beacons should focus efforts in locations in urban areas where there are a number of visual distractions.

Drivers cannot react to see even the brightest beacon when a pedestrian does not activate it. As discussed in the *Interim Report* pedestrians must take certain precautions to ensure their own safety. Where there is a pedestrian activated beacon installed at a crosswalk, the pedestrian is expected to ensure the beacon is activated prior to entering the crosswalk. The beacon is activated by the pedestrian pushing or touching the supplied push button device. Once activated, the system will flash the beacons for a predetermined period of time based on the width of the road.

It has come to the attention of the Task Force that if the button is pushed again within that predetermined time period it will have no effect on the system. So, if a pedestrian has already activated the system and another pedestrian arrives during the time of activation and attempts to reactivate the system, it will not reset. This may allow the predetermined period to expire and the beacons to turn off shortly after the second pedestrian enters the crosswalk, giving no notice to drivers that the second pedestrian is present.

The Task Force is concerned with this method of operation and offers the following recommendation:

35. MUNICIPALITIES AND THE PROVINCE SHOULD UNDERTAKE A PROGRAM TO UPDATE PEDESTRIAN ACTIVATED BEACON INSTALLATIONS TO ENABLE THE EXTENSION OF THE SIGNAL WHEN THE PEDESTRIAN BUTTON IS RE-ACTIVATED. PRIORITY SHOULD BE GIVEN TO THOSE INSTALLATIONS WHERE FREQUENT PEDESTRIAN CROSSINGS ARE ANTICIPATED.

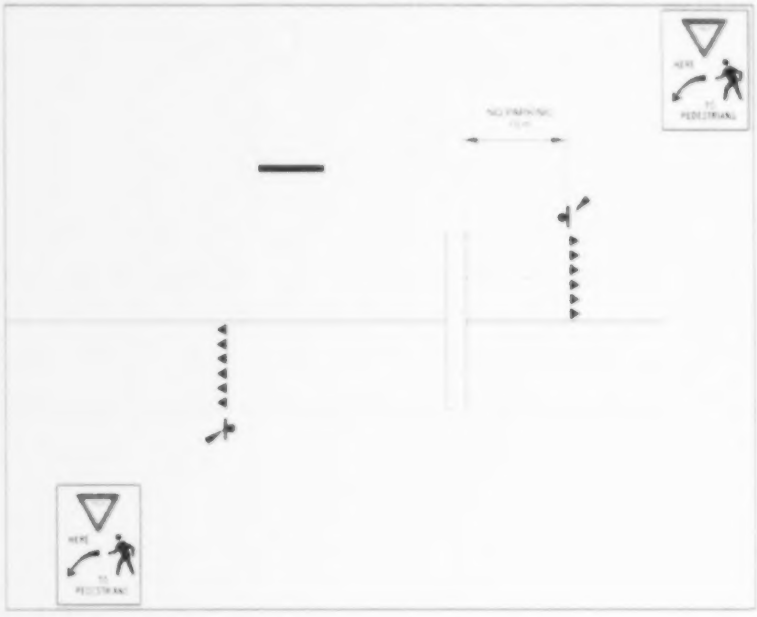
Extension of the activated beacon signal assists pedestrians to finish crossing safely. The province and municipalities must prioritize installations by locations where frequent pedestrian crossings are anticipated.

AN X ON THE PAVEMENT

Some time ago, an advance X on the pavement was used as an advance indication of a crossing. In Canada "X" pavement markings are now reserved to denote the approach to a railway crossing. However other advance pavement markings have been shown to be effective in increasing yielding distance at crosswalks.[cxxxi]

The yield bar, also known as "shark's teeth" or "saw-tooth markings" when placed in advance a crosswalk and combined with a sign with the message "Yield Here to Pedestrians", has been shown in one study to increase the distance from the crosswalk at which drivers yield to pedestrians. This additional distance is particularly important on multi-lane roads, because vehicles stopped close to the crosswalk can prevent pedestrians and drivers approaching in adjacent lanes from seeing each other.

Figure 16 An Example of Advance Yield Markings



Therefore, the Task Force recommends:

36. FURTHER PILOT STUDIES SHOULD BE CONDUCTED TO DETERMINE THE LONG-TERM EFFECTS OF ADVANCE YIELD MARKINGS AND SIGNS ON DRIVER YIELDING DISTANCE AND COMPLIANCE AT CROSSWALKS ON MULTI-LANE APPROACHES.

RE-PAINTING/MAINTENANCE OF PAVEMENT MARKINGS

The Task Force received a number of public comments regarding the painting and maintenance of pedestrian crosswalks and the Task Force shares this concern. It is important that the markings used to denote crosswalks are kept in good condition such that they are visible in daytime and at night.

Nova Scotia's climate makes it difficult to keep crosswalk markings in good condition year round. Snowplow blades and the use of salt and sand for traction can wear the paint away in the winter months. Repainting of crosswalks can only take place when pavement surfaces are dry and warm and ambient air temperatures are warm. Most wear occurs in the winter; therefore, a program to repaint crosswalks cannot begin until late spring. When a jurisdiction has a large number of crosswalks, the painting program may last a number of months, meaning that some crosswalks may be in poor condition for some time. In this case, the road authority must prioritize their crosswalk repainting program such that the most worn and/or most highly travelled crosswalks are painted earliest in the year. Crosswalks subjected to unusually high vehicular traffic volumes may require repainting in spring and again in the fall. With these points in mind, the Task Force recommends:

37. CROSSWALK MARKINGS SHOULD BE MAINTAINED BY THE MUNICIPALITY AND/OR THE PROVINCE TO KEEP THEM AS LEGIBLE AS IS PRACTICAL.

This would require Traffic Authorities and/or Municipalities to develop inspection and maintenance programs to ensure crosswalks are continually surveyed and painted annually at a minimum. Where inspection and maintenance programs identify a need crosswalks should be painted more frequently.

SPEED BUMPS OR RUMBLE STRIPS IN ADVANCE OF CROSSWALKS.

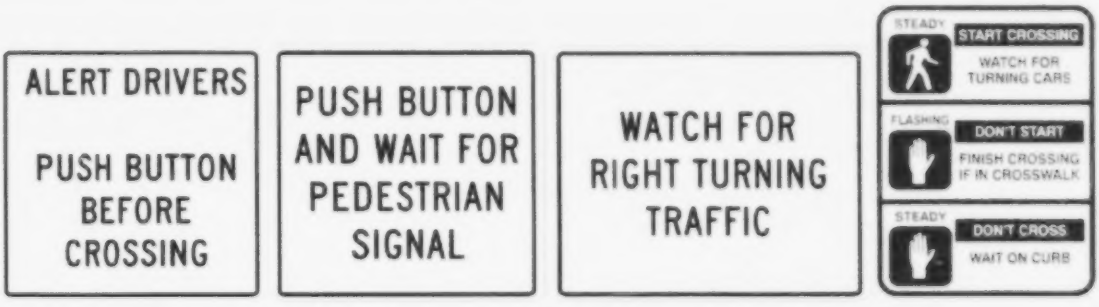
The use of speed bumps or rumble strips has been suggested to draw a driver's attention to an upcoming crosswalk. A speed bump is a fairly abruptly raised section across the travelled way. Because of this, they are generally used to control traffic speeds in low speed areas such as parking lots or driveways. They are not suitable for use on public roads. Speed humps, on the other hand, are raised portions of the roadway that are wider and more gradual than speed bumps. They are used for traffic calming on neighbourhood streets. They are generally not used on main thoroughfares because they result in too great a reduction in vehicle speeds. Vehicles such as fire apparatus can be damaged by speed humps and response times can also be negatively affected.

Rumble strips are patterns of grooves cut into the road surface to create a vibrating sensation and sound when a vehicle travels over them. They are placed across the traveled way to alert drivers approaching a change of roadway condition or a hazard that requires substantial speed reduction or other manoeuvring. Rumble strips are not commonly used in residential areas or business districts due to the unwelcome noise that can be heard in nearby buildings whether pedestrians are present or not.

SIGNS ADVISING PEDESTRIANS AT CROSSWALKS TO BE CAUTIOUS

The placement of signs or pavement markings at a crosswalk to warn pedestrians to be careful has been used in the UK and other jurisdictions. The Task Force believes that there is some merit to this signage, especially at signalized intersections. These locations can present a danger to pedestrians from drivers turning right or left on the green light. Signalized intersections also provide ample opportunity for mounting signs. At unsignalized intersections or unmarked crosswalks the addition of an extra sign may do more harm than good by simply adding to the roadside clutter, further drawing attention away from the pedestrian.

Figure 17 Samples of Pedestrian Specific Signs



38. PEDESTRIAN SPECIFIC SIGNS SHOULD BE CONSIDERED TO PROVIDE PEDESTRIANS WITH FEEDBACK AND REMINDERS TO CROSS SAFELY. THESE DEVICES SHOULD ONLY BE INSTALLED WHERE THERE ARE PEDESTRIAN CONTROL DEVICES (I.E. WALK/DON'T WALK SIGNALS, PEDESTRIAN ACTIVATED BEACONS) AND WHERE THEY HAVE BEEN DETERMINED TO HAVE TECHNICAL MERIT.

PAINT CROSSWALKS YELLOW OR SOME OTHER BRIGHT COLOUR.

It has been suggested that changing the colour of crosswalk markings may increase their visibility. In Canada, the *MUTCDC* requires that all transverse markings be white, with the exception of gore area markings and diagonal lines in medians, which are yellow.

In recent years, a number of US jurisdictions had been experimenting with the use of yellow-green pavement markings for crosswalks. However, the US Federal Highway Administration has determined, based on a Chicago, Illinois, study that yellow-green crosswalk markings did not improve crosswalk safety. It has since abandoned any other trials of yellow-green crosswalk markings.

INSTALLATION OF TRAFFIC ISLANDS ON MULTI-LANE CROSSINGS

Pedestrian refuge islands and raised medians provide pedestrians a place to stop in the middle of their crossing if it becomes unsafe to continue or if they do not have time to complete their crossing. This can be especially helpful to those pedestrians, such as elderly or disabled persons, who have a slower walking speed and for people crossing wider roads that require more time to cross.

The presence of a raised median or crossing island has been associated with a significantly lower crash rate on roads with multiple lanes, at both marked and unmarked crosswalks.[cxxxii] It was also found that painted medians that were not raised did not offer these same safety benefits. Additionally, Fitzpatrick et al.[cxxxiii] found that medians and refuge islands have higher compliance rates on lower-speed roadways.[cxxxiv]

Therefore the Task Force recommends:

39. **MUNICIPALITIES AND TIR SHOULD CONSIDER INSTALLING RAISED PEDESTRIAN REFUGES FOR NEW AND REDESIGNED HIGHWAYS WHEN THOSE HIGHWAYS HAVE MORE THAN TWO LANES IN EACH DIRECTION. REFUGES SHOULD BE CONSTRUCTED TO ALLOW AMPLE SPACE FOR WHEELCHAIRS, ETC. TO WAIT FOR A CROSSING OPPORTUNITY.**

The Task Force received a submission from the Halifax Regional Municipality Advisory Committee for Persons with Disabilities (the Committee). The Committee had a number of suggestions for improving crosswalk safety for people with disabilities. They are addressed below.

Crosswalks must be in direct alignment with the curb cuts. The non-alignment of the two causes all pedestrians both able bodied and persons with disabilities to enter unprotected space to get into the crosswalk.

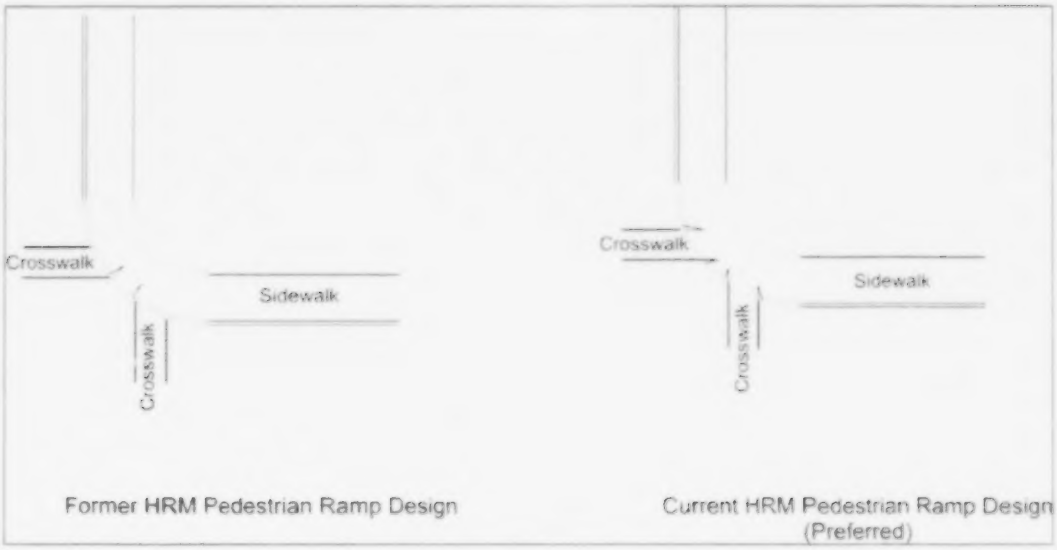
The use of one single curb cut on a corner should be curtailed. There should be two curb cuts both feeding directly to the crosswalks. The use of one curb cut on the corner means they are not only non-aligned with the crosswalk but it often distracts a person with a visual disability using a cane to end up at a diagonal angle into the street.

The standards of the [grades for] curb cuts themselves must be reviewed to ensure that the curb cut is safe. It should not require a person to back down into the crosswalk because of steepness and thereby affecting their physical view of what is happening.

The Task Force recognizes the importance of curb cuts being aligned with crosswalks. The ability for a person to stand and directly face the crosswalk gives important signals to approaching drivers. Once drivers have stopped, it is equally important for pedestrians to be able to enter the street for the most efficient crossing opportunity possible.

The Task Force members have seen some older intersections that have a pedestrian ramp which enters the roadway on an angle, intended for the pedestrian to walk either to the right or left to enter the crosswalk. However, current HRM standards now require the ramp to be constructed such that the pedestrian may enter directly onto the crosswalk. This is achieved by requiring separate curb cuts for each crosswalk except where the curb cuts would be close together. In that case the small "uncut" curb is omitted and a single large cut provided that extends as far as the two separate cuts would have otherwise done. The new curb cuts are also wider than the old standard and require that there is a gradual grade with no abrupt bumps.

Figure 18 An Example of a Pedestrian Ramp Design Example



The task Force recommends:

40. THE PROVINCE AND MUNICIPALITIES MUST ADOPT HRM'S CURRENT PEDESTRIAN RAMP DESIGN AS A PROVINCIAL STANDARD.

It is important to place all controls for audible signals in a standardized position. This would assist persons with disabilities and ensure a person with vision loss could assume if an audible signal was in place at a corner and they would have a standardized place to find the controls.

The use of audible signals must be increased. These prove to be highly effective for a person with vision or hearing loss to support determining a safe place to cross.

The Transportation Association of Canada (TAC) recently approved a new publication: *Guidelines for Understanding, Use and Implementation of Accessible Pedestrian Signals* (The Guidelines). The Guidelines provide agencies with practical and uniform information on audible pedestrian signals (APS) prioritization, design, installation, operations and maintenance. They recommend standardized button and pole locations and the use of pole locator tones to assist visually impaired pedestrians to find the button.

Deploying agencies are also recommended to consult with local representatives of people with vision loss to assist in the identification of APS needs, issues, and in determining installation priorities.[cxxxv]

As an example, HRM staff is actively involved with the Visually Impaired Safe Travel Advocates (VISTA) committee which consists of Canadian National Institute for the Blind staff and several members of the visually impaired community. One of the committee's tasks is to identify locations where APS would be most beneficial. Therefore, the Task Force recommends:

41. MUNICIPALITIES AND THE PROVINCE MUST FOLLOW THE TRANSPORTATION ASSOCIATION OF CANADA (TAC) *GUIDELINES FOR UNDERSTANDING, USE AND IMPLEMENTATION OF ACCESSIBLE PEDESTRIAN SIGNALS* WHEN CONSIDERING ACCESSIBLE PEDESTRIAN SIGNALS TO ENSURE UNIFORMITY AND CONSISTENCY.

If the crosswalk is on a [divided] street the median should have a sizeable place for a wheelchair to remain safely on the median to wait for the next opportunity to cross. To ensure that the median is effective it must be sizable to enable a wheelchair to wait on the median to safely cross. As was stated in Task Force Recommendation 41.

EDUCATION

The Task Force received several comments regarding the need for more pedestrian and crosswalk safety education. The following discussion addresses the two themes that emerged from these formal and informal submissions. The majority of submissions discussed the importance of crosswalk safety education within the school system and general public awareness education.

Pedestrian safety education is an essential component to crosswalk safety. There are several ways of educating Nova Scotians about crosswalk safety as discussed in "The Role of Education in Crosswalk Safety." Effective education strategies are comprehensive, targeted for the right audience with the right resources; and delivered at the right time with the most appropriate resources.

CROSSWALK SAFETY EDUCATION IN SCHOOLS

The importance of educating children about pedestrian safety, and safety in general should not be underestimated. Effective pedestrian safety education within the school curriculum is most effective when included within a larger safety education strategy. At a young age children have difficulty generalizing their skills, meaning they are unable to take safety skills from one area and apply them to another. The ability to generalize safety skills depends mainly on two factors: their stage of development and the amount of experience. This is why curriculum-based resources such

as Risk Watch and Think First are important. These resources are two internationally recognized evidence-based injury prevention resources for children.

These resources are slightly different, but have similar approaches. The educational materials focus on age appropriate activities and the related childhood injuries and creates teaching modules for each safety area. Risk Watch bases its program on establishing relationships between teachers, safety experts, and parents/guardians. Think First relies on the teacher to deliver the curriculum based on their professional judgement. Creating a safety mindset is essential for enabling children to develop a sense of responsibility for their actions.[cxxxvi]

Experts in child development believe children benefit from active supervision of a parent/guardian or older child until the age of nine when crossing roadways. Children under the age of nine:

- Believe they are not vulnerable
- Believe adults will always take care of them (including all drivers)
- Act on impulse
- Do not have a complete sense of perception and peripheral vision
- Focus only on things of interest
- Have challenges knowing where sounds are originating.[cxxxvii]

While children have these challenges to accommodate, it is important that children have many opportunities to practice these safety skills. Active learning is not only essential for children, youth, but for adults as well. People learn best when they are actively engaged and directly involved in the activity. Giving children the opportunity to gather firsthand experience in acquiring or reviewing newly attained or existing skills is the key to effective learning. Taking part in a closely supervised program at ages nine and below is highly effective. Many jurisdictions have used walking school buses and safe routes to school programs to provide children with these opportunities. There is conflicting research on the challenges towards achieving sustainability of these types of programs.[cxxxviii]

In Nova Scotia, some school boards are hesitant towards adopting walking school buses or active/safe routes to school programs. The Task Force respects the decisions of these school boards and is concerned about the conflicting research on their sustainability. Therefore, the Task Force is hesitant to make a formal recommendation for school boards to adopt these types of programs. However, overlooking active learning as a valuable experience for children and youth would be a mistake. The Task Force encourages communities, families, and schools to explore opportunities for active engagement of children in crosswalk safety education.[cxxxix]

Adults and older adults should not be ignored when considering crosswalk safety education. By the time Nova Scotians earn their driver's license, they take on the dual responsibility of pedestrian and driver. The sense of this dual responsibility is often not conscious, instead many view themselves as either driver or pedestrian. Crosswalk safety education provides an opportunity to make people aware of their shared responsibility to respect and obey the rules of the road as pedestrians and drivers. The literature review and additional research revealed that other jurisdictions are targeting citizens with the shared responsibility message.[cxl]

In Nova Scotia, HRM has invested a considerable amount of time and resources to educate the public about traffic and pedestrian safety. HRM committed funding towards promoting awareness of crosswalk safety through newspaper articles, Metro Transit bus panels, and television advertising. HRM and Global Television began to produce public service announcements (PSA) related to pedestrian safety in the spring of 2005, and have continued producing new PSAs each year thereafter related to crosswalk and bicycle safety matters. Eastlink Television has also been running a recent series of PSA's on crosswalk safety.[cxli]

The Task Force debated on whether to make a formal recommendation for province-wide public awareness campaigns. There was some discussion to modify HRM's *Crosswalk Safety in Halifax Regional Municipality* booklet to reflect the provincial perspective. The Task Force considered formally recommending a public awareness campaign on crosswalk safety; however, social marketing campaigns, depending on the complexity of the subject, target audience, and type and size of campaign, can be very costly. In the time available to the Task Force, a thorough review of the costs, benefits, and effectiveness of such campaigns was not possible. The Task Force does; however, value public awareness campaigns and strongly suggests RSAC and RSAC member departments explore opportunities to promote crosswalk safety within a comprehensive road safety education strategy. Many aspects of road safety need to be dealt with and concentrating only on crosswalk safety may jeopardize funding for other road safety matters.

ENFORCEMENT

The comments received about enforcement generally fall into two categories 1) increase in penalties for pedestrian collisions and 2) increase enforcement at crosswalks and intersections.

INCREASED PENALTIES

The majority of comments received on enforcement requested the Task Force recommend stricter and increased penalties for drivers that strike a pedestrian or fail to yield.

During deliberations, law enforcement officers on the Task Force outlined how the investigation and legislation dictates the offence and penalties. The evidence and the findings of an investigation dictate charges laid under the MVA or the CCC, but not both. The Crown is responsible for reviewing all the evidence of the investigation and assigning the most appropriate charge to the driver or pedestrian.

PROVINCIAL – MOTOR VEHICLE ACT (MVA)

After comparing Nova Scotia's summary offence penalties to other provinces, the Task Force learned that Nova Scotia has some of the most strict penalties in the country. For example Nova Scotian drivers, particularly newly licensed drivers, can have their license suspended before drivers in other provinces, due to demerit point accumulation.

When a driver is involved in a pedestrian collision and depending on the results of the investigation and evidence, the potential summary offences and penalties are detailed in Table 6.

Table 6: Summary Offence Regulations & Penalties for Drivers[cxliii]

Offence	MVA Section	Offence Category	Penalty (1st offence)	Demerit Points
Failing to obey traffic sign or signal	83(2)	B	$164.50	2
Failing to yield right of way to pedestrian on green or flashing green light	93(2)(a)	B	$164.50	2
Failing to yield right of way to pedestrian on green arrow light	93(2)(b)	B	$164.50	2
Failing to stop at amber light when able to stop safely	93(2)(c)	B	$164.50	2
Failing to stop at red light	93(2)(e)	B	$164.50	2
Failing to yield to pedestrian on turn at red light	93(2)(e)	B	$164.50	2
Failing to stop before entering intersection at flashing red light	93(2)(f)	B	$164.50	2
Failing to yield to pedestrian or other vehicle at flashing red light	93(2)(f)	B	$164.50	2
Driving at speed that exceeds maximum rate of speed in school area	103(1)	D (double)	$279.50	4
Driving at speed that exceeds posted speed limit or other maximum speed limit in Act by 1 to 15 km/h, inclusive, in other than temporary work area	106A(a)	C (double)	$337.00	2
Driving at speed that exceeds posted speed limit or other maximum speed limit in Act by 16 to 30 km/h, inclusive, in other than temporary work area	106A(b)	D	$279.50	3
Driving at speed that exceeds posted speed limit or other maximum speed limit in Act by 31 km/h or more in other than temporary work area	106A(c)	F (double)	$394.50	4
Failing to yield to pedestrian in crosswalk	125(1)	F	$394.50	4
Passing stopped vehicle at crosswalk	125(2)	F	$394.50	4
Failing to obey crossing guard directing children in a crosswalk	125A(4)	F	$394.50	4
Failing to stop at stop sign	133(1)	B	$164.50	2
Failing to obey yield sign	134(3)	B	$164.50	2

How demerit points affect a driver is dependent upon the category of driver. The following table outlines how the number of demerit points effects different categories of drivers.

Table 7: Assignment of Demerit Points & Category of Driver

Driver Category	Warning Letter	Interview	6- Month Suspension
Learner		2 points	4 points
Newly Licensed Driver	2 points	4 points	6 points
All Others	4 points	6 points	10 points

A driver who receives enough points to warrant an interview must also complete a road test. An accumulation of demerit points by a learner or a newly licensed driver will affect their ability to obtain their full license.

As was discussed in "The Role of Enforcement in Crosswalk Safety" section of this Report, the Registrar has the authority to review a driver's abstract and address any concerns about a driver's abilities, skills, and behaviours. The Registrar may require the driver undergo a medical

examination, take a defensive driving course, complete a re-examination, or even suspend or revoke their driver's license. The Nova Scotia Freedom of Information and Privacy Act prohibits the release the names of suspended drivers. The release of this information does not enhance public safety.[cxliii] It is possible, but unknown to the Task Force members that drivers who have been involved in pedestrian collisions and who have received the "small" fine of $394.50 plus four points may have also faced these actions by the Registrar.

The Registrar has the authority under the MVA to revoke a driver's license automatically and immediately after a conviction for any of the following offenses:

- Failing to stop at the scene of an accident if conviction is under the CCC
- Causing death or bodily harm by criminal negligence in the operation of a motor vehicle
- Manslaughter resulting from the operation of a motor vehicle
- Criminal negligence (where death or injury has not been caused)
- Theft of a motor vehicle or taking a motor vehicle without the consent of the owner
- Driving while impaired by alcohol or any drug
- Failure or refusal to provide a breath sample
- Driving with more than 80 mg of alcohol in 100 ml of blood
- Dangerous driving (CCC)
- Driving while disqualified (due to revocation or suspension of license)
- Making a false affidavit, declaration, or statement to the department
- Refusing to provide a blood sample

Some criticise that the suspension of a license is not enough of a deterrent for drivers. However, studies have suggested that suspended drivers consider suspension a deterrent, even for those who continue to drive without a valid license. Suspended drivers tend to drive more carefully and less frequently out of fear of exposing themselves. "Suspended drivers are said to weigh the benefits of illegal driving against the risk of detection ... If such drivers decide to take the risk of driving whilst under suspension they usually adhere to traffic laws in order to reduce the chances of detection."[cxliv] The ultimate threat of having their license revoked forces most suspended drivers to be careful, as revocation will threaten their lifestyle and livelihood even more.[cxlv]

While the Task Force obviously does not condone suspended drivers that continue to drive, it is important to consider that suspension may curb some unsafe driving behaviour.

As crosswalk safety is a shared responsibility, pedestrians must know that they are also subject to MVA offences and penalties.

The following table outlines the pedestrian offences.

Table 8: Summary Offence Regulations & Penalties for Pedestrians

Offence	MVA Section	Category Offence	Penalty
Pedestrian not in crosswalk failing to yield to vehicle	125(3)	F	$394.50
Pedestrian failing to obey traffic signal	126	B	$164.50
Failing to move on right half of crosswalk	127(1)	A	$135.75
Failing to use sidewalk	127(2)	A	$135.75
Failing to walk on left side of highway	127(3)	A	$135.75

Law enforcement officers find it difficult to ticket pedestrians with an offence because pedestrians often do not have identification with them. Without identification, the law enforcement officer and the Crown – if the pedestrian contests the charge—cannot prove the pedestrian identified is the one who committed the offence.

NATIONAL – CRIMINAL CODE OF CANADA (CCC)

In the instance where a pedestrian collision has resulted in a pedestrian fatality, charging the driver under the CCC requires evidence of intent. The evidence and findings of an investigation must identify that the driver was operating their vehicle with the *intent* to do harm or intending to drive recklessly and without due care.

CHARGE BY DEGREE OF SEVERITY

The Task Force received comments stating drivers involved in pedestrian fatalities deserve a murder, manslaughter, or criminal negligence charge and imprisonment. The Task Force believes it does not have the expertise in criminal law or authority to recommend pursuing such charges in a pedestrian collision fatality. Each collision is unique, and as law enforcement officers shared with the Task Force, the charge is dependent on the evidence and the results of the investigation. The Task Force believes applying a criminal negligence, manslaughter, or murder charge to a driver when the evidence and the investigation support it, is appropriate.

During its deliberations, the Task Force, found the requirement of intent to charge a driver with criminal negligence, manslaughter, or murder interesting and worth sharing with Nova Scotians. The following is a general description of each type of charge and is not a direct interpretation of the CCC, ***it is intended for information purposes only***.

Some Nova Scotians wrote to the Task Force stating drivers involved in a pedestrian fatality, deserve a charge of criminal negligence causing death. The CCC conditions for a charge of criminal negligence is:

> ***219*** *(1) Every one is criminally negligent who (a) in doing anything, or (b) in omitting to do anything that it is his duty to do, shows wanton or reckless disregard for the lives or safety of other persons. ...* ***220.*** *Every person who by criminal negligence causes death to another person is guilty of an indictable offence and liable (a) where a firearm is used in the commission of the offence, to imprisonment for life and to a minimum punishment of imprisonment for a term of four years; and (b) in any other case, to imprisonment for life.* [cxlvi]

The evidence against a driver would have to demonstrate they were showing "wanton or reckless disregard for the lives or safety of other persons".

Generally, the definition of murder means the charged intended to kill an individual, or knew their actions would probably result in death and did it anyway. Under the CCC the charge of murder may be **first-degree** or **second-degree**. The CCC defines **first-degree murder** as something that is

> *"planned and deliberate ... when it is committed pursuant to an arrangement under which money or anything of value passes or is intended to pass from one person to another, or is promised by one person to another, as consideration for that other's causing or assisting in causing the death of anyone or counseling another person to do any act causing or assisting in causing that death... planned and deliberate on the part of the person, murder is first degree murder when the death is caused while committing or attempting to commit an offence under section 423.1"* [23]

The definition of **second-degree murder** is "[a]ll murder that is not first degree murder is second degree murder."[cxlvii] Essentially what this means is the accused did not plan to commit murder, but knew their actions would probably result in death and continued to act in such a manner as to cause death.

The charge of manslaughter applies when

> *"the person who committed it [manslaughter] did so in the heat of passion caused by sudden provocation. What is provocation (2) A wrongful act or an insult that is of such a nature as to be sufficient to deprive an ordinary person of the power of self-control is provocation for the purposes of this section if the accused acted on it on the sudden and before there was time for his passion to cool."*[cxlviii]

In other words, the death was not premeditated, the accused did not intend to kill the individual, but their actions demonstrated neglect towards the life of the individual. The accused does not have to *know* their actions would lead to the death of an individual; simply that they acted without considering the consequences of their actions.

In each instance, proof either of intent, premeditation or negligence of the consequences for their actions is evident.

---

[23] Criminal Code, s. 229.
Section 423.1 refers to the intimidation of a judicial system participant or journalist that impedes them from doing their work. Often this type of charge is in relation to "a criminal organization." Criminal Code, s. 423.1. There are types of first-degree murder such as murder of an officer, criminal harassment, terrorism, kidnapping, and hijacking.

Dangerous driving charges imply the driver intended to harm and/or engage in dangerous driving behaviour that could result in the death or injury of another person. A driver charged with dangerous operation of a motor vehicle has operated it

> *"in a manner that is dangerous to the public, having regard to all the circumstances, including the nature, condition and use of the place at which the motor vehicle is being operated and the amount of traffic that at the time is or might reasonably be expected to be at that place"*[xxix]

Applying a CCC charge to a driver in a pedestrian collision fatality requires proof of intent to harm or drive with undue care for the consequences of their behaviour(s).

During deliberations and presentations law enforcement officers explained the challenges to charging a driver with a CCC offence. Many of the challenges relate to the amount and detail of evidence needed for a conviction under the CCC. The Crown is ultimately responsible for reviewing the evidence and weighing the probability of conviction when deciding what charge a driver should face.

The majority of drivers do not intend to strike a pedestrian, nor do pedestrians intend to walk out in front of vehicles; however, pedestrian collisions do occur. It is rare that only one party is completely at fault, being alert and responsive every moment of travel is difficult and a momentary lapse can result in a collision. The objective for pedestrians and drivers is to be aware of their environment, practice safe behaviours, and if a collision occurs, respond to the best of their capabilities.

Pedestrian collision fatalities affect the families and friends of both the driver and the pedestrian. Those affected share in the grieving process and must cope with the consequences.

INCREASED ENFORCEMENT

Law enforcement officers are a visible symbol of crosswalk safety as enforcers and educators. Many who wrote to the Task Force requested an increase in the presence of law enforcement officers and enforcement. The Task Force agrees with Nova Scotians and advances several recommendations to increase law enforcement resources. Although, increasing resources alone, does not guarantee better enforcement, law enforcement agencies and officers require support through professional development opportunities, clear legislation, and sustained funding.[24]

[24] For a discussion of the Task Force's recommendations, see "The Role of Enforcement in Crosswalk Safety", of this Report, 62-74.

CONCLUDING OBSERVATIONS

The Crosswalk Safety Task Force believes this Report will assist in enhancing crosswalk safety in Nova Scotia. It is now the responsibility of the Minister of Transportation and Infrastructure Renewal and the Mayor of Halifax Regional Municipality to encourage the adoption and implementation of the recommendations.

The Task Force has advanced a comprehensive set of recommendations based on the understanding that engineering, education, enforcement, and evaluation all have a role in crosswalk safety.

The Task Force firmly believes to effectively increase crosswalk safety, it is imperative that road safety in Nova Scotia improve. Therefore, the Task Force recommends:

42. THE DEPARTMENTS RESPONSIBLE FOR ENHANCING ROAD SAFETY MUST DEVELOP A COMPREHENSIVE ROAD SAFETY STRATEGY THAT IS EVIDENCE-BASED AND COMBINES ENGINEERING, EDUCATION, AND ENFORCEMENT COUNTERMEASURES. THE PROVINCE MUST DEDICATE FUNDING AND RESOURCES TO ENHANCE, SUPPORT, AND MAINTAIN ROAD SAFETY INITIATIVES AND ENCOURAGE NOVA SCOTIANS TO ACCEPT ROAD AND CROSSWALK SAFETY AS A SHARED RESPONSIBILITY.

All of the Recommendations advanced, taken together, will:

- strengthen the relationships amongst the province and municipal traffic authorities, law enforcement officers, and educators
- create a public policy framework that is responsive to future crosswalk and road safety challenges
- establish provincial uniformity and consistency of crosswalk treatments
- empower pedestrians and drivers to make informed choices about crosswalk safety
- increase RSAC and RSAC member departments understanding of the factors of crosswalk safety
- improve collision data collection, analysis, surveillance, and evaluation
- increase government's accountability for crosswalk and road safety

It is important to respond to these recommendations in a timely manner. This Report and Recommendations will assist government to move forward in establishing a road safety strategy that best serves Nova Scotians.

As Nova Scotians we all have a role to play in crosswalk safety. If these recommendations are to be successful, we must take responsibility for our actions and respect the rules of the road, and most importantly each other.

REFERENCES

Atlantic Network for Injury Prevention and SmarkRisk. *The Economic Burden of Unintentional Injury.* Revised 2nd Printing. SmartRisk, 2003.

Baragwanath, Honourable Justice et al. *Total Recall the Reliability of Witness Testimony.* Wellington, New Zealand : Law Commission, 1999.

Barlow, Janet (Ecology Action Centre). "Road Safety Skills Training Overview." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 22 May 2007.

Barton, Benjamin K. "Integrating Selective Attention into Developmental Pedestrian Safety Research." *Canadian Psychology.* 47.3 (2006) : 203-210.

Bijou, S. "Behavior Analysis" in *Annals of child development.* Vol. 6. Ed. R. Vasta. Greenwich, Conn.: JAI Press, 1989 : 61-84

Blackwell, Ann and Natalie Flinn (Department of Education). "Pedestrian Safety in the Curriculum." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 21 August 2007.

Branyan, George. *Pedestrian Safety Enforcement: The Maryland Experience.* Presentation Online: Available www.bikewalk.net/sessions/24_Ped_Safety_Enforcement/Branyan_MD_Ped_Enf_9_04.ppt Maryland : Maryland Highway Safety Office & State Highway Administration, 8 September 2004, Accessed: August 2007

Bronfenbrenner, U. "Ecological systems theory." *Annals of Child Development: Six Theories of Child Development-Revised Formulations and Current Issues.* Ed. R. Vasta. Grennwich, Conn.: JAI Press, 1989.

Campagna, Phil Ph. D, et al. *PACY 2005: Physical Activity Levels and Dietary Intake of Children and Youth In the Province of Nova Scotia --- 2005.* Halifax Regional Municipality, Nova Scotia : Departments of Health Promotion and Protection & Education, 2005.

Canada. Centre of Excellence for Evaluation. *Preparing and Using Results-based Management and Accountability Frameworks.* Ottawa, Ontario : Treasury Board of Canada Secretariat, January 2005.

Canada. Traffic Injury Research Foundation. *The Road Safety Monitor 2006: Drinking and Driving.* Ottawa, Ontario : Traffic Injury Research Foundation, 2006.

Canadian Council of Motor Transportation Administrators. *A Look at CCMTA,* Online : Available www.ccmta.ca. 2006 : Accessed September 2007.

Canadian Council of Motor Transportation Administrators. *Road Safety Vision 2010: Making Canada's Roads the Safest in the World 2005 Annual Report.* TP 13347 E. Ottawa, Ontario : Transport Canada, October 2006.

Canadian Council on Social Development. *The Progress of Canada's Children and Youth.* 2006. 50-60. Online: Available: http://www.ccsd.ca/pccy/2006/pdf/pccy_2006.pdf. Accessed 1 October 2007.

Canadian Institute of Child Health. *Active / Safe Routes to School: A Literature Review and Summary of Key Informant Interviews on Child/Youth Risk Factors Associated with Active Transportation To and From School and Recommendations to Promote Safe Routes.* Ottawa, Ontario: Canadian Institute of Child Health, 1998.

Carpenter, Philip. *Automated Traffic Enforcement Technologies: An Overview of Canadian and International Implementations and Experiences.* August 2005.

Carter, Daniel L. et al. *Pedestrian and Bicyclist Intersection Safety Indices: Final Report.* Publication No. FHWA-HRT-06-125. McLean, VA : Federal Highway Administration, November 2006.

Casbard, Theresa et al. *Strategic Guidance for Road Safety Professionals.*Birmingham, UK : Royal Society for the Prevention of Accidents (RoSPA), 2003.

Case, R. *Intellectual Development: Birth to Adulthood.* New York: Academic Press, 1985.

Chisholm, Sarah and Catherine Kennedy. "Crosswalk Safety: Current Themes in Literature." Literature Review. 2007.

Criminal Code. Revised Statutes of Canada. 1985. Chapter C-46. Online : Department of Justice Canada <http://laws.justice.gc.ca>)

Crosswalk Safety Task Force Submission, 2007

Delaney, Amanda, Kathy Diamantopoulou, and Max Cameron, *Strategic Principles of Drink-Driving Enforcement* Report 249. Melbourne, Australia: Monash University Accident Research Centre, July 2006.

DiScala, Carla, Ilana Lescohier, Martha Barthel, & Guohua Li. "Injuries to Children with Attention Deficit Hyperactivity Disorder. *Pediatrics* 102 (1998) : 1415-1421.

Fitzpatrick, Kay et al. *Improving Pedestrian Safety at Unsignalized Crossings.* Report No. 112. Washington, D.C.: Transportation Research Board, 2006.

Flavell, J. *Cognitive Development.* 2nd ed. Englewood Cliffs, N.J.: Prentice Hall, 1985.

Florida. Florida Bicycle Association. *Florida Pedestrian Law Enforcement Guide: A review of Florida's pedestrian traffic laws to help with warnings, citations, and crash reports,* 2nd ed. Waldo, Florida : Florida Department of Transportation, 2007.

Freedom of Information and Protection of Privacy Act. *1993, c. 5, s. 1*

Halifax Chamber of Commerce. *Crosswalk Safety & Awareness Forum: Changing Behaviour -- Saving Lives.* Halifax Regional Municipality: Halifax Chamber of Commerce, April 2007.

Halifax Regional Municipality. Halifax Regional Police. *Crossing Guard Training.* Halifax Regional Municipality : Halifax Regional Police, August 1999.

Halifax Regional Municipality. Nova Scotia. *Crossing Guard Handbook.* Halifax Regional Municipality : Halifax Regional Police, July 2002.

Halifax Regional Municipality. Nova Scotia. *Crosswalk Safety in Halifax Regional Municipality: Taking Charge of Your Own Safety.* Halifax Regional Municipality, Nova Scotia : Traffic and Right of Way Services, 2007.

Halifax Regional Municipality. Nova Scotia. *Crosswalk Safety.* Halifax Regional Municipality : Halifax Regional Police.

Halifax Regional Municipality. Nova Scotia. *Traffic Safety.* Halifax Regional Municipality : Halifax Regional Police

Harrison, Warren A. and Michael Fitzharris. *Drinking and Driving in Rural Victoria: A Survey of Hotel Patrons.* Report No 154. Melbourne, Australia : Monash University Accident Research Centre, 1999.

Harrison, Warren A. and Nicola J. Pronk. *An investigation of the Relationship between Traffic Enforcement and the Perceived Risk of Detection for Driving Offences.* Report No 134. Melbourne, Australia : Monash University Accident Research Centre, 1998.

Herms, B. *Pedestrian Crosswalk Study: Crashes in Painted and Unpainted Crosswalks.* Record No. 406. Washington, DC : Transportation Research Board, 1972.

Hinde, R. A. Ethological relationships and approaches. In *Annals of Child Development: Six theories of Child Development-Revised Formulations and Current Issues.* Ed.R. Vasta Greenwich, Conn.: JAI Press, 1989.

Johnson, Ian. "Speed Management "Down Under." Presentation. Melbourne, Australia : Monash University Accident Research Centre, circ. 2003.

Johnson, Mavis, and Eric Howard. *Road Safety Vision 2010: Mid-Term Review.* Final Report. Ottawa, Ontario: CCMTA, July 2007.

Kircher, Katja. *Driver Distraction: A Review of the Literature.* VIT Publishing, 2007.

Loane, Gregg, Kaman Pang, and Ron Stewart. *The New TAC Accessible Pedestrian Signals Guidelines.* Saskatoon : "Innovation in Traffic Operations and Management Session" of the 2007 Annual Conference of the Transportation Association of Canada, 2007.

McLean, AJ, et al. *Vehicle Travel Speeds and the incidence of Fatal Pedestrian Collisions: Volume 1.* Report No. CR146. Adelaide, South Australia : Federal Office of Road Safety, October 1995.

Mills, Terry (Department of Transportation and Infrastructure Renewal). "Pedestrian Collisions Statistics Crosswalk Safety Task Force." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 25 September 2007.

Motor Vehicle Act. *R.S., c. 293*

Nassi, Richard B. P.E., Ph.D. & Michael J. Barton, P.E., P.T.O.E. *HAWK Beacon Signals to Facilitate Pedestrian Crossings - Operational Report.* Paper. Presented Pittsburgh, Pennsylvania & Published, May 2006.

National Committee on Uniform Traffic Control. *Manual of Uniform Traffic Control Devices for Canada.* 4 ed. Rev.3 Ottawa, Ontario: Transportation Association of Canada, December 2002.

National Committee on Uniform Traffic Control. *Pedestrian Crossing Control Manual.* Ottawa, Ontario: Transportation Association of Canada, March 1998.

National Cooperative Highway Research Program. "Accessible Pedestrian Signals: Synthesis and Guide to Best Practice." *Research Results Digest* 278, (July 2003).

New Jersey. United States of America. *Pedestrians.* Online: Available http://www.nj.gov/oag/hts/pedestrian.html : Accessed August 2007.

North Carolina. Division of Bicycle and Pedestrian Transportation. *Training for Law Enforcement Officers on Bicycle and Pedestrian Laws and Local Law Enforcement Strategies to Improve Safety.* North Carolina, Department of Transportation.

Nova Scotia. Crosswalk Safety Task Force. *Interim Report of the Crosswalk Safety Task Force.* Halifax Regional Municipality : Department of Transportation and Public Works, 2007.

Nova Scotia. Department of Health Promotion and Protection and Emergency Health Services. *Nova Scotia Injury Prevention Strategy: Report and Recommendations.* Halifax Regional Municipality, Nova Scotia : Queen's Printer, 2003.

Nova Scotia. Department of Health Promotion and Protection. *Changing the Culture of Alcohol Use in Nova Scotia: An Alcohol Strategy to Prevent and Reduce the Burden of Alcohol Related Harm in Nova Scotia* (Halifax Regional Municipality : Department of Health Promotion and Protection, 2007.

Nova Scotia. Department of Transportation and Communications. *City of Halifax and Province of Nova Scotia Pedestrian Safety Task Force Report.* Halifax: Province of Nova Scotia, 1990.

Nova Scotia. Department of Transportation and Public Works. *Nova Scotia Crossing Guards Handbook* (Halifax Regional Municipality, Nova Scotia, 2002.

Nova Scotia. Seniors Secretariat. *2007 Programs for Seniors.* 18th Ed. Halifax Regional Municipality, Nova Scotia : Queens Printer, 2007.

Nova Scotia. Service Nova Scotia and Municipal Relations. *Nova Scotia Driver's Handbook.* Halifax, Nova Scotia: Queen Printer, 2006.

Oakland City. California. *Pedestrian Master Plan.* Oakland, California: Department of Transportation, 12 November 2002.

Ontario. Ministry of Transportation. *Curb Your Aggression.* Toronto, Ontario : Ministry of Transportation, n.d.

Ontario. Ministry of Transportation. *Smart Drivers Just Drive.* Toronto, Ontario : Ministry of Transportation, n.d.

Oregon. Department of Transportation. *The Safety of Pedestrians is in your Hands.* Portland, Oregon: DOT, 2006.

Oxley, Jennie and Brian Fides. *Safety of Older Pedestrians: Strategy for Future Research and Action Initiatives* Report. No. 157. Victoria, Australia : Monash University Accident Research Center, June 1999.

Reashor, Ken (Halifax Regional Municipality). "Halifax Regional Municipality Crosswalk Safety Booklet." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 19 June 2007.

Retting, Richard A. Susan A. Ferguson, and Anne T. McCartt. "A Review of Evidence-Based Traffic Engineering Measures Designed to Reduce Pedestrian – Motor Vehicle Crashes," *American Journal of Public Health* 93.9 (2003) 1456-1463.

Risk Watch. *Risk Watch Unintentional Injuries.* Online : Available http://www.riskwatch.org/about.html, Accessed October 2007.

Safe Kids Canada. *Child & Youth Unintentional Injury: 10 Years in Review 1994-2003.* Toronto, Ontario : Safe Kids Canada, Updated 2007.

Safe Kids Canada. *Making it Happen: Pedestrian Safety – A Guide for Communities.* Toronto, Ontario : Safe Kids Canada, 2004.

San Jose. California. *Crosswalks in San Jose.* San Jose, California : Department of Transportation, 2006.

Smith, Paul (Road Safety Engineer, Department of Transportation and Infrastructure Renewal). "Review of Pedestrian and Crosswalk Crash Statistics – Provincial." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 22 May 2007.

South Australia. Department of Transport, Energy, & Infrastructure, *Walking with Care: Fact Sheet 1* Online: Available http://www.transport.sa.gov.au/rss/content/safer_people/road_users/older_pedestrians_walk_with_care_program.htm. Adelaide, South Australia : Department of Transport, Energy, & Infrastructure, September 1999 : Accessed July 2007.

---. *Fact Sheet 2: Walking with Care and Being Seen*

----. *Fact Sheet 3: Walking with Care at traffic lights*

---. *Fact Sheet 4: Walking with care at roundabouts*

---. *Fact Sheet 5: Walking with care and using refuges and medians*

---. *Fact Sheet 6: Pedestrians with impaired hearing or vision – being aware of your capabilities*

---. *Fact Sheet 7: Pedestrians with reduced mobility – being aware of your capabilities*

Spearns, Sgt. Michael. "Traffic and Crosswalk Safety and Enforcement in Nova Scotia." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 11 September 2007.

Staplin, L., K. Lococo, S. Byington, and D. Harkey. *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians.* Publication No. FHWA-RD-01-051. McLean, VA : Federal Highway Administration, May 2001.

Stollof, Edward, Hugh McGee, and Kimberly A. Eccles. *Pedestrians Signal Safety for Older Persons.* Washington, DC : Institute of Transportation Engineers, July 2007.

Taylor, Alan (Halifax Regional Municipality). "Speed Management Program Initiated in Melbourne Australia in 2001." Presentation. Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 11 September 2007.

Think First Foundation of Canada. *Think First.* Online : Available http://www.thinkfirst.ca/default.asp: Accessed October 2007.

Toronto. Ontario. "City of Toronto: Transportation Services- Pedestrian Safety 'We're All Pedestrians.'" Online: Available http://www.toronto.ca/transportation/publications/pedestrian_safety/index.html : Accessed August 2007.

Transportation Association of Canada. *Guidelines for Understanding, Use and Implementation of Accessible Pedestrian Signals*, 2007.

Ungar, Michael Ph.D. "Seeking Balance: How the Right Amount of Risk and Responsibility Benefits Children." Presentation. Halifax Regional Municipality : Nova Scotia Injury Prevention Strategy Renewal Symposium, 28 November 2007.

United States of America. Department of Transportation. *Stepping Out – Mature Adults: Be Healthy, Walk Safely.* Washington, DC : US Department of Transportation, n.d.

Van Houten, Ron, Sherry Huybers, & J. E. Louis Malenfant. "Reducing Conflicts Between Motor Vehicles and Pedestrians: The Separate and Combined Effects of Pavement Markings and A Sign Prompt." *Journal of Applied Behavioural Analysis* 37 (2004) : 445-456.

Vanlaar, Ward, Herb Simpson, Dan Mayhew, and Robyn Robertson. *The Road Safety Monitor 2006: Aggressive Driving.* ISBN: 978-0-920071-70-0. Ottawa, Ontario : Traffic Injury Research Foundation [TIRF], 2007.

Victoria. Australia. Auditor General Victoria. *Making Travel Safer: Victoria's Speed Enforcement Program*. Victoria, Australia: Victorian Government Printer, July 2006.

Victoria. Australia. *Looking out for Pedestrians – An Outline*. Victoria, Australia : Online : Available http://www.vicroads.vic.gov.au/NR/rdonlyres/2511A561-732F-4C00-9755EEE8B12231B9/0/LookingOutForPedestrians.pdf Accessed: 14 September 2007.

Victoria. Australia. VicRoads. *Walking with Care*. Victoria, Australia : Online: Available http://www.vicroads.vic.gov.au/NR/rdonlyres/C9D60DCE-1F68-4281-829B-AE3CA3A87116/0/WalkWithCare.pdf, nd Accessed August 2007.

Vygotsky, L. *Mind in society: The development of higher psychological processes*. Cambridge, Mass.: Harvard University Press, 1978.

Wellman, H. The early development of memory strategies. In *Memory development: Universal changes and individual differences*. Eds. H. Weinert and M. Perlmutter. Hillsdale, N.J.: Erlbaum, 1988 : 3 - 30.

Yield the right-of-way to a pedestrian. No. 340 01(75). Wisconsin Legislature Data. 2001-2002.

Zaal, D. *Traffic Law Enforcement: A review of the Literature*. Report No 53. Melbourne, Australia : Monash University Accident Research Centre, April 1994.

Zegeer, C. V. et al. Safety Analysis of Marked Versus Unmarked Crosswalks in 30 Cities *74.1 Institute of Transportation Engineers Journal*, 2004.

Zegeer, Charles V. et al. *PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System*. FHWA-SA-04-003. Washington DC : U.S. Department of Transportation & Federal Highway Administration, 2004.

Zegeer, Charles V. et al. *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations*. FHWA-RD-04-100. McLean, VA : Department of Transportation & Federal Highway Administration, 2005.

APPENDICES

Appendix A: Terms of Reference II

Appendix B: Members of the Crosswalk Safety Task Force IV

Appendix C: Presentations VI

APPENDIX A: TERMS OF REFERENCE

Crosswalk Safety Task Force

PURPOSE

To identify strategies and measures to improve crosswalk safety.

CO-CHAIRS

Bernie Clancey, TPW
Ken Reashor, HRM

MEMBERSHIP

Mr. Rob Hird, TPW
Mr. Alan Taylor, HRM
Dr. Fred French, Mount Saint Vincent University
Mr. Harland Wyand, Town of Bridgewater
Mr. Gilles Chiasson (retired)
Mr. Brian Lillington, HRM Police Service
Mr. Mark Furey, Department of Justice
Mr. Morris Green, Health Promotion and Protection
Ms. Lori Payne, Service Nova Scotia and Municipal Relations

TASKS

- Review all relevant research, reports and background material
- Solicit presentations from experts and stakeholders as required
- Document relevant past and current rules, programs and practices that support crosswalk safety including, but not limited to, legislation, engineering, public awareness and education, enforcement, and emergency response
- Prepare a report and recommendations

DELIVERABLES

- July 31, 2007 interim report due. Focus of interim report is to be on any legislative changes.
- November 15, 2007 final report due.

MEETINGS

A bi-weekly meeting schedule has been established. The Task Force may meet less frequently as they progress.

REPORTING

The task force will provide a presentation of their report and recommendations to the Minister of Transportation & Public Works, the Mayor of Halifax Regional Municipality and the Road Safety Advisory Committee (RSAC).

Roles & Responsibilities

Co-Chairs

- Spokespersons for the committee
- Leadership
- Maintain order and a sharing environment
- Keep the group focused and on-task
- Manage process and ensure follow-up occurs
- Assigning tasks and deadlines

Individual Members

- Attendance and punctuality
- Come prepared
- Be open, leave pre-conceived ideas at the door
- Communication to and from your "community"
- Be respectful and honest
- Critical thinker, active listener and constructive debater

Coordinator

- Maintain communications
- Timely completion and distribution of meeting minutes and materials
- Information sharing and dissemination

APPENDIX B: MEMBERSHIP OF THE CROSSWALK SAFETY TASK FORCE

Bernie Clancey, P. Eng., is the Manager of Traffic Engineering Services for TPW. Clancey is also the Deputy Provincial Traffic Authority for the Province of Nova Scotia, with 27 years experience in the field of traffic and transportation engineering. As Manager, his responsibilities include overseeing implementation of uniform and consistent traffic control measures on provincial highways. He is a member of the Transportation Association of Canada's Traffic Operations and Management Standing Committee, RSAC's Vulnerable Road User Sub-committee. Clancey is co-chair of the Task Force.

Ken Reashor, P. Eng., is a professional engineer with over 35 years of experience in the field of Municipal and Transportation Engineering. His experience includes working with the Nova Scotia Housing Commission in Dartmouth for five years, and as an associate engineering consultant in Edmonton. Reashor was a consultant for nine years for both a private development industry and the Alberta Housing Corporation. Reashor then became a city engineer for the Town of Fort McMurray and was the Transportation Manager in the City of Calgary for 14 years. He then left municipal government to begin his own business as a private transportation consultant for three years. In 2003, after 26 years in Alberta, Reashor returned to Halifax to become, and currently acts as, the Manager of Traffic & Right of Way Services and the Traffic Authority for Halifax Regional Municipality. Reashor is co-chair of the Task Force.

Gilles Chiasson is the former deputy registrar of the Registry of Motor Vehicles. He was a safety education officer for 11 years, teaching highway and pedestrian safety skills in schools to elementary, junior and senior high students. He was also a defensive driving instructor and driver improvement officer. Currently, he volunteers with the Senior Safe Driving program.

Dr. Fred French holds a Ph.D., from the University of Alberta with a focus in School Psychology and has approximately 30 years experience in various roles in education. He has been with the Faculty of Education at Mount Saint Vincent University since 1985 teaching courses in Education, School Psychology and Exceptionality. His research and policy interests as they pertain to this committee lie in decision making and its implications for risk taking and at risk behaviours; the rights/responsibilities of children and youth and youth at risk particularly those with learning disabilities; and, in the development and evaluation of educational programs addressing personal/social development and responsible decision making/problem solving.

Staff Sgt. Mark Furey is a 27-year veteran of the Royal Canadian Mounted Police, presently on secondment to the Nova Scotia Department of Justice (DOJ) as a Policing Consultant. As the DOJ representative on RSAC, he is the Chairperson of the Traffic Forum Sub-committee (Alcohol Countermeasures Committee) as well as the Operation Road Safety Sub-committee. Staff Sgt. Furey has extensive experience in operational and administrative duties as a Commander in both rural and urban communities.

Morris Green, B.P.E., M.S., is an Injury Prevention Health Promoter with Nova Scotia Health Promotion and Protection. Green has worked in injury prevention for five years and has been involved in health promotion projects for more than 20 years.

Rob Hird P. Eng., is a Traffic Studies Engineer with TPW's Traffic Engineering Services Group. He also serves as a member of the Vulnerable Road-users Sub-committee of the Road Safety Advisory Committee (RSAC). Hird brings 15 years experience in Traffic and Transportation Engineering and has been involved in the installation and maintenance of a number of marked crosswalks in both urban and suburban areas of the province.

Constable Brian Lillington has 24 years experience as a police officer and has worked as a Collision Reconstructionist in the Collision Investigation Section with the Halifax Regional Police. He has worked for seven years in the Traffic Section in Enforcement & Investigation and for 6 years been a School Liaison Officer in schools from Primary to High School. Presently, he is a member of RSAC, and held this position for three years.

Lori Payne, B.Sc., B.Sc.OT., is the Coordinator of Medical Fitness and the Acting Coordinator of Driver Competency with the Road Safety Division of SNSMR. She is a member of the Seniors' Safe Driving Committee, the Provincial Driving While Impaired Committee, and the Medical Advisory Committee on Driver Licensing. She brings expertise in reviewing individual driver records and making recommendations for discretionary actions under the MVA to the Deputy Registrar of Motor Vehicles.

Alan Taylor, P.Eng., is a Transportation Planner with HRM and is a member of the Vulnerable Road Users Sub-committee of RSAC. He has 26 years of experience in transportation engineering and planning.

Harland Wyand is employed as the Town Engineer and Traffic Authority for the Town of Bridgewater. Wyand is a Professional Civil Engineer and worked as a consultant nationally and internationally; working primarily in Municipal Engineering for 19 years prior to joining the Town. As Town Engineer and Traffic Authority, Wyand is responsible for transportation and traffic issues, municipal infrastructure and installation of traffic signs and signals aimed at improving pedestrian and vehicular safety. Wyand is an active member of the Municipal Public Works Association of Nova Scotia and represents the smaller urban municipalities' perspective and concerns on the Task Force.

APPENDIX C: PRESENTATIONS

The following organizations and individuals made presentations to the Crosswalk Safety Task Force and listed in the chronological they presented.

• Michelle Higgins	Legal Solicitor for TIR MVA	Crosswalk Rules, Offences & Penalty Provisions
• Janet Barlow	Ecology Action Centre	Road Safety Skills Training Overview
• Rob Hird	TIR	Province of Nova Scotia's Crosswalk Intsallation Practices
• Ken Reashor	HRM	Review of Pedestrian & Crosswalk Crash Statistics(HRM) HRM Crosswalk Safety Booklet
• Paul Smith	TIR	Review of Pedestrian & Crosswalk Crash Statistics (NS)
• Alan Taylor	HRM	Engineering Alternative Concepts Speed Management "Down Under" (Melbourne, Australia)
• Sarah Chisholm & Catherine Kennedy	TIR & HPP	Crosswalk Safety: Current Themes in Literature
• Ann Blackwell & Natalie Flinn	Dept. of Education	Pedestrian Safety in the Curriculum
• Sgt. Michael Spearns	HRP	Enforcement & Crosswalk Safety
• Terry Mills	Policy & Planning TIR	Pedestrian Collisions Statistics

[i] "Yield the right-of-way to a pedestrian". No. 340.01(75). Wisconsin Legislature Data. 2001-2002.
[ii] D. Zaal, *Traffic Law Enforcement: A review of the Literature*. Report Number 53 (Melbourne, Australia: Monash University Accident Research Centre, April 1994) : 1.
[iii] Zaal, *Traffic Law Enforcement* 1-2.
[iv] Nova Scotia, Department of Transportation & Communications, *City of Halifax and Province of Nova Scotia Pedestrian Safety Task Force Report* (Halifax: Province of Nova Scotia, 1990).
[v] Dept. TC, *Pedestrian Safety Task Force Report* 7.
[vi] Halifax Chamber of Commerce, *Crosswalk Safety & Awareness Forum: Changing Behaviour -- Saving Lives* (Halifax Regional Municipality : Halifax Chamber of Commerce, April 2007).
[vii] Canadian Council of Motor Transportation Administrators [CCMTA], *Road Safety Vision 2010: Making Canada's Roads the Safest in the World 2005 Annual Report* TP 13347 E (Ottawa : Transport Canada, October 2006) : 1.
[viii] Richard A. Retting, Susan A. Ferguson, and Anne T. McCartt, "A Review of Evidence-Based Traffic Engineering Measures Designed to Reduce Pedestrian – Motor Vehicle Crashes," *American Journal of Public Health* 93.9 (2003) : 1462.
[ix] Nova Scotia, Department of Health Promotion and Protection & Emergency Health Services, *Nova Scotia Injury Prevention Strategy: Report and Recommendations* (Halifax Regional Municipality : Queen's Printer, 2003) : 15.
[x] Atlantic Network for Injury Prevention & SmarkRisk, *The Economic Burden of Unintentional Injury*, Revised 2nd Printing (SmartRisk, 2003) : 17-20.; HPP & EHS, *Nova Scotia Injury Prevention Strategy* 4-6.
[xi] Mavis Johnson & Eric Howard, *Road Safety Vision 2010: Mid-Term Review*. Final Report. (Ottawa : CCMTA, July 2007) : 10.
[xii] CCMTA, *RSV 2010 2005 Annual Report*; Johnson & Howard, *Mid-Term Review*; Charles V. Zegeer, et al, *PEDSAFE: Pedestrian Safety Guide and Countermeasure Selection System* FHWA-SA-04-003 (Washington DC : U.S. Department of Transportation & Federal Highway Administration, 2004) : 7-10.
[xiii] CN Kloeden, JE Woolley, AJ McLean, *Further evaluation of the South Australian default 50 km/h speed limit* Report No. CASR034 (Adelaide, South Australia : Centre for Automotive Safety Research, December 2006).
[xiv] AJ. McLean, et al., *Vehicle Travel Speeds and the incidence of Fatal Pedestrian Collisions: Volume 1* Report No. CR146 (Adelaide : October 1995).
[xv] AJ. McLean, et al., *Vehicle Travel Speeds*.
[xvi] ibid.
[xvii] Philip Carpenter, *Automated Traffic Enforcement Technologies: An Overview of Canadian and International Implementations and Experiences*, August 2005.
[xviii] Ian Johnson, *Speed Management "Down Under."* Presentation (Melbourne, Australia : Monash University Accident Research Centre, circ. 2003); Victoria, Australia, Auditor General Victoria, *Making Travel Safer: Victoria's Speed Enforcement Program*, (Victoria, Australia: Victorian Government Printer, July 2006). Presented by Alan Taylor (Halifax Regional Municipality) "Speed Management Program Initiated in Melbourne Australia in 2001". Presentation (Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 11 September 2007).
[xix] Zaal, *Traffic Law Enforcement* 1-2.
[xx] Canada, Traffic Injury Research Foundation [TIRF], *The Road Safety Monitor 2006: Drinking and Driving* (Ottawa, Ontario : Traffic Injury Research Foundation, 2006) : iii & 5.
[xxi] TIRF, *The Road Safety Monitor 2006* 7.
[xxii] Johnson & Howard, *Mid-Term Review* 52-75.
[xxiii] Qut., Nova Scotia, Department of Health Promotion and Protection [HPP], *Changing the Culture of Alcohol Use in Nova Scotia: An Alcohol Strategy to Prevent and Reduce the Burden of Alcohol Related Harm in Nova Scotia* (Halifax, Department of Health Promotion and Protection, 2007) : 9 & 31-32.
[xxiv] Retting, Ferguson, & McCartt, "A Review of Evidence-Based Traffic Engineering Measures" 1456; Victoria, Australia, *Looking out for Pedestrians – An Outline*, Online (Victoria, Australia : Available: http://www.vicroads.vic.gov.au/NR/rdonlyres/2511A561-732F-4C00-9755EEE8B12231B9/0/LookingOutForPedestrians.pdf) Accessed: 14 September 2007: 4 & 45; Johnson & Howard, *Mid-Term Review* 95-96.
[xxv] Johnson & Howard, *Mid-Term Review* 95-96.
[xxvi] HPP, *Changing the Culture of Alcohol*.
[xxvii] Warren A. Harrison & Michael Fitzharris, *Drinking and Driving in Rural Victoria: A Survey of Hotel Patrons*, Report no 154 (Melbourne, Australia : Monash University Accident Research Centre, 1999) : 2.
[xxviii] Harrison & Fitzharris, *Drinking and Driving in Rural Victoria* 29.
[xxix] Paul Smith, "Review of Pedestrian and Crosswalk Crash Statistics – Provincial," Presentation, (Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 22 May 2007).
[xxx] Katja Kircher, *Driver Distraction: A Review of the Literature*, (VIT Publishing, 2007).
[xxxi] Kircher, *Driver Distraction* 5.
[xxxii] Ibid., 9.
[xxxiii] Ontario, Ministry of Transportation, *Smart Drivers Just Drive* (Toronto, Ontario : Ministry of Transportation, n.d).
[xxxiv] Kircher, *Driver Distraction* 28; Ontario, Ministry of Transportation, *Curb Your Aggression* (Toronto, Ontario : Ministry of Transportation, n.d); Ward Vanlaar, Herb Simpson, Dan Mayhew, & Robyn Robertson, *The Road Safety Monitor 2006: Aggressive Driving* ISBN: 978-0-920071-70-0 (Ottawa, Ontario : Traffic Injury Research Foundation [TIRF], 2007).
[xxxv] HPP & EHS, *Nova Scotia Injury Prevention Strategy* 5 & 21.

[xxxvi] Crosswalk Safety Task Force Submission. 2007; Theresa Casbard, et al. *Strategic Guidance for Road Safety Professionals*, (Birmingham, UK : Royal Society for the Prevention of Accidents (RoSPA), 2003) : 17.

[xxxvii] Daniel L. Carter et al., *Pedestrian and Bicyclist Intersection Safety Indices: Final Report*, Publication No. FHWA-HRT-06-125 (McLean, VA : Federal Highway Administration, November 2006) : 13. For a discussion on the guidelines currently used for marking a crosswalk, see "The Role of Engineering in Crosswalk Safety" of this Report , 42-50.

[xxxviii] Honourable Justice Baragwanath, et al. *Total Recall the Reliability of Witness Testimony*, (Wellington, New Zealand : Law Commission, 1999) : 6.

[xxxix] Safe Kids Canada, *Making it Happen: Pedestrian Safety – A Guide for Communities* (Toronto, Ontario : Safe Kids Canada, 2004) : 6.

[xl] Safe Kids Canada is a national organization, founded in 1992, which uses evidence-based research to develop and promote methods for preventing unintentional childhood injuries such as booster seats, water temperatures, and bike helmets. http://www.sickkids.on.ca/safekidscanada/default.asp

[xli] Safe Kids Canada, *Child & Youth Unintentional Injury: 10 Years in Review 1994-2003* (Toronto, Ontario : Safe Kids Canada, Updated 2007) : 4-5.

[xlii] Safe Kids Canada, *Child & Youth Unintentional Injury* 4.

[xliii] Safe Kids Canada, *Making it Happen* 5-8; Canadian Institute of Child Health [CICH], *Active / Safe Routes to School: A Literature Review and Summary of Key Informant Interviews on Child/Youth Risk Factors Associated with Active Transportation To and From School and Recommendations to Promote Safe Routes*, (Ottawa, Ontario: Canadian Institute of Child Health, 1998); Canadian Council on Social Development [CCSD]. *The Progress of Canada's Children and Youth*. 2006. 50-60. (Available: http://www.ccsd.ca/pccy/2006/pdf/pccy_2006.pdf, 1 October 2007); Terry Mills (Department of Transportation and Infrastructure Renewal) "Pedestrian Collisions Statistics Crosswalk Safety Task Force", Presentation (Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 25 September 2007).

[xliv] Phil Campagna Ph. D. et al., *PACY 2005: Physical Activity Levels and Dietary Intake of Children and Youth In the Province of Nova Scotia --- 2005*. (Halifax, NS: Departments of Health Promotion and Protection & Education, 2005): 65. – The numbers presented are those that were included in the survey and not from the general population.

[xlv] Campagna et al., *PACY 2005* 65. One other important factor to consider is the number of children that take a bus to school in rural parts of Nova Scotia.

[xlvi] CCSD, *The Progress*.

[xlvii] CICH, *Active / Safe Routes to School*; CCSD,*The Progress*.; Mills "Pedestrian Collisions Statistics"; Michael Ungar, Ph.D. "Seeking Balance: How the Right Amount of Risk and Responsibility Benefits Children," Presentation (Halifax Regional Municipality : Nova Scotia Injury Prevention Strategy Renewal Symposium, 28 November 2007).

[xlviii] CCSD,*The Progress*.; Safe Kids Canada, *Making it Happen*; Safe Kids Canada, *Child & Youth Unintentional Injury* 4-8.

[xlix] Barton, Benjamin K. "Integrating Selective Attention into Developmental Pedestrian Safety Research." *Canadian Psychology*. 47.3 (2006) : 203-210. Nova Scotia, Crosswalk Safety Task Force Meetings, 2007.

[l] Victoria, Australia, *Looking out for Pedestrians* 4 & 5.

[li] Victoria, Australia, *Looking out for Pedestrians*; United States of America, Department of Transportation, *Stepping Out – Mature Adults: Be Healthy, Walk Safely* (Washington, DC : US Department of Transportation, n.d); L. Staplin, K. Lococo, S. Byington, & D. Harkey,, *Guidelines and Recommendations to Accommodate Older Drivers and Pedestrians* Publication No. FHWA-RD-01-051 (McLean, VA : Federal Highway Administration, May 2001).

[lii] Nova Scotia, Seniors Secretariat, *2007 Programs for Seniors* 18th ed. (Halifax, Nova Scotia : Queens Printer, 2007).

[liii] Mills "Pedestrian Collisions Statistics".

[liv] Smith, "Review of Pedestrian".

[lv] L. Staplin, K. Lococo, S. Byington, & D. Harkey, *Guidelines and Recommendations*; Edward Stollof, Hugh McGee, and Kimberly A. Eccles, *Pedestrians Signal Safety for Older Persons*, (Washington, DC : Institute of Transportation Engineers) : July 2007.

[lvi] Kay Fitzpatrick et al, *Improving Pedestrian Safety at Unsignalized Crossings*, Report No. 112 (Washington, DC: Transportation Research Board, 2006); Oakland City, California. *Pedestrian Master Plan*. (Oakland, California: Department of Transportation, 12 November 2002) : 61-62; Charles V. Zegeer, et al., *Safety Effects of Marked Vs. Unmarked Crosswalks at Uncontrolled Locations*, FHWA-RD-04-100 (McLean, VA : Department of Transportation & Federal Highway Administration, 2005).

[lvii] Victoria, Australia, *Looking out for Pedestrians* 4 & 5.

[lviii] Sarah Chisholm & Catherine Kennedy, "Crosswalk Safety: Current Themes in Literature," (Literature Review, 2007).

[lix] HPP & EHS, *Nova Scotia Injury Prevention Strategy* 15.

[lx] "Yield the right-of-way to a pedestrian", No. 340.01(75), Wisconsin Legislature Data, 2001-2002..

[lxi] Zaal, *Traffic Law Enforcement* 2.

[lxii] B. Herms, *Pedestrian Crosswalk Study: Crashes in Painted and Unpainted Crosswalks*, Record No. 406, (Washington, DC : Transportation Research Board, 1972).

[lxiii] Zegeer, et al, *Safety Effects*.

[lxiv] Zegeer, et al, *Safety Effects* 51.

[lxv] Kay Fitzpatrick et al, *Improving Pedestrian Safety*.

[lxvi] Zaal, *Traffic Law Enforcement* 2.

[lxvii] Chisholm & Kennedy, "Crosswalk Safety".

[lxviii] U. Bronfenbrenner, "Ecological systems theory" in *Annals of Child Development: Six Theories of Child Development-Revised Formulations and Current Issues*, Ed. R. Vasta, (Grennwich, Conn.: JAI Press, 1989); L. Vygotsky, *Mind in society: The development of higher psychological processes* (Cambridge, Mass.: Harvard University Press, 1978); R. A. Hinde, Ethological

relationships and approaches, in *Annals of Child Development: Six Theories of Child Development-Revised Formulations and Current Issues*, Ed. R. Vasta (Greenwich, Conn.: JAI Press, 1989).

[lxix] S. Bijou, "Behavior analysis," in *Annals of Child Development: Vol. 6* Ed. R. Vasta (Greenwich, Conn.: JAI Press, 1989) : 61-84; R. Case, *Intellectual Development: Birth to Adulthood* (New York: Academic Press, 1985).

[lxx] H. Wellman, "The early development of memory strategies," in *Memory development: Universal Changes and Individual Differences* Eds. H. Weinert and M. Perlmutter (Hillsdale, N.J.: Erlbaum, 1988) : 3 - 30.

[lxxi] J. Flavell, *Cognitive development*, 2nd ed. (Englewood Cliffs, N.J.: Prentice Hall, 1985).

[lxxii] Chisholm & Kennedy, "Crosswalk Safety"; Barton, "Integrating Selective Attention" 203-210.

[lxxiii] CCSD, *The Progress*.

[lxxiv] Johnson & Howard, *Mid-Term Review* 23-44.

[lxxv] Mills, "Pedestrian Collisions Statistics".

[lxxvi] Halifax Chamber of Commerce, "Crosswalk Safety & Awareness Forum".

[lxxvii] Safe Kids Canada, *Child & Youth Unintentional Injury* 20-21; CICH, *Active / Safe Routes to School* 28-29.

[lxxviii] Kay Fitzpatrick et al, *Improving Pedestrian Safety*; Barton, "Integrating Selective Attention" 203-210; Safe Kids Canada, *Child & Youth Unintentional Injury* 20-21; CICH, *Active / Safe Routes to School*; Safe Kids Canada, *Making it Happen*; Victoria, Australia, *Looking out for Pedestrians* 4-6, 11, & 24-25.

[lxxix] Barton, "Integrating Selective Attention" 203-210; Carla DiScala, Ilana Lescohier, Martha Barthel, & Guohua Li, "Injuries to Children with Attention Deficit Hyperactivity Disorder, *Pediatrics* 102 (1998) : 1415-1421.

[lxxx] Ann Blackwell & Natalie Flinn, (Dept. of Education) "Pedestrian Safety in the Curriculum" Presentation (Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 21 August 2007).

[lxxxi] Blackwell & Flinn, "Pedestrian Safety in the Curriculum".

[lxxxii] Safe Kids Canada, *Making it Happen* 18-19. Safe Kids Canada, *Child & Youth Unintentional Injury*; CICH, *Active / Safe Routes to School*; Campagna et al., *PACY 2005* 65; Janet Barlow (Ecology Action Centre) "Road Safety Skills Training Overview," Presentation (Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 22 May 2007); CCSD, *The Progress*.

[lxxxiii] Casbard, et al, *Strategic Guidance* 50-52; Halifax Regional Municipality, *Crossing Guard Handbook* (Halifax Regional Municipality : Halifax Regional Police, July 2002); Halifax Regional Municipality, Halifax Regional Police, *Crossing Guard Training* (Halifax, Regional Municipality : Halifax Regional Police, August 1999); Nova Scotia, Department of Transportation and Public Works, *Nova Scotia Crossing Guards Handbook* (Halifax Regional Municipality, Nova Scotia, 2002).

[lxxxiv] Casbard, et al, *Strategic Guidance* 5-8 & 17-32.

[lxxxv] Victoria, Australia, *Looking out for Pedestrians*; Chisholm & Kennedy, "Crosswalk Safety".

[lxxxvi] Victoria, Australia, *Looking out for Pedestrians*; L. Staplin, K. Lococo, S. Byington, & D. Harkey, *Guidelines and Recommendations*; Chisholm & Kennedy, "Crosswalk Safety"; Stoolof, McGee, & Eccles, *Pedestrian Signal*.

[lxxxvii] Victoria, Australia, *Looking out for Pedestrians*; U.S. Dept. Transportation, *Stepping Out*; South Australia, Department of Transport, Energy, & Infrastructure, *Walking with Care: Fact Sheet 1* Online: Available http://www.transport.sa.gov.au/rss/content/safer_people/road_users/older_pedestrians_walk_with_care_program.htm (Adelaide, South Australia : Department of Transport, Energy, & Infrastructure, September 1999) Accessed August 2007; ---, *Walking with Care and Being Seen: Fact Sheet 2*; ----.*Walking with Care at traffic lights*: Fact Sheet 3; ---, *Walking with care at roundabouts*: Fact Sheet 4; ---, *Walking with care and using refuges and medians*: Fact Sheet 5; *Pedestrians with impaired hearing or vision – being aware of your capabilities*: *Fact Sheet 6*; ---, *Pedestrians with reduced mobility – being aware of your capabilities*: *Fact Sheet 7*; Victoria, Australia, VicRoads, *Walking with Care* (Victoria, Australia : Online: Available http://www.vicroads.vic.gov.au/NR/rdonlyres/C9D60DCE-1F68-4281-829B-AE3CA3A87116/0/WalkWithCare.pdf, nd) Accessed August 2007.

[lxxxviii] Victoria, Australia, *Looking out for Pedestrians*; L. Staplin, K. Lococo, S. Byington, & D. Harkey, *Guidelines and Recommendations*; Jennie Oxley & Brian Fides, *Safety of Older Pedestrians: Strategy for Future Research and Action Initiatives* Report No. 157 (Victoria, Australia : Monash University Accident Research Center, June 1999).

[lxxxix] Zaal, *Traffic Law Enforcement* 2.

[xc] ibid 7.

[xci] ibid.

[xcii] ibid 6.

[xciii] Halifax Regional Municipality, *Traffic Safety* (Halifax Regional Municipality : Halifax Regional Police); Halifax Regional Municipality, *Crosswalk Safety* (Halifax Regional Municipality : Halifax Regional Police).

[xciv] Sgt. Michael Spearns, "Traffic and Crosswalk Safety and Enforcement in Nova Scotia," Presentation (Halifax Regional Municipality: Crosswalk Safety Task Force Meeting, 11 September 2007); Crosswalk Safety Task Force Meetings, 2007.

[xcv] Sgt. Spearns, "Traffic and Crosswalk Safety.

[xcvi] Zaal, *Traffic Law Enforcement* 7.

[xcvii] Johnson & Howard, *Mid-Term Review* ES7-8.

[xcviii] Zaal, *Traffic Law Enforcement* 28.

[xcix] ibid xi -xii.

[c] ibid 2; 13-19; 30-33.

[ci] Delaney, Diamantopoulou, & Cameron, *Strategic Principles* 1.

[cii] Ibid.

[ciii] Zaal, *Traffic Law Enforcement* vii-viii & 8.

[civ] ibid2.
[cv] *ibid* vii-viii & 8; Warren A. Harrison & Nicola J. Pronk, *An investigation of the Relationship between Traffic Enforcement and the Perceived Risk of Detection for Driving Offences*, Report No. 134 (Melbourne, Australia : Monash University Accident Research Centre, 1998) : 37.
[cvi] Zaal, *Traffic Law Enforcement* vii-viii.
[cvii] ibid 29.
[cviii] ibid 13.
[cix] ibid 16-17.
[cx] ibid.
[cxi] Chisholm & Kennedy, "Crosswalk Safety".
[cxii] Crosswalk Task Force Meetings, 2007; Sgt. Spearns, "Traffic and Crosswalk Safety.
[cxiii] Blackwell & Flinn, "Pedestrian Safety in the Curriculum".
[cxiv] North Carolina, Division of Bicycle and Pedestrian Transportation, "Training for Law Enforcement Officers on Bicycle and Pedestrian Laws and Local Law Enforcement Strategies to Improve Safety," (North Carolina, Department of Transportation, n.d) : 1; George Branyan, *Pedestrian Safety Enforcement: The Maryland Experience*, Presentation Online: Available www.bikewalk.net/sessions/24_Ped_Safety_Enforcement/Branyan_MD_Ped_Enf_9_04.ppt (Maryland : Maryland Highway Safety Office & State Highway Administration, 8 September 2004) Accessed: August 2007; Florida, Florida Bicycle Association, *Florida Pedestrian Law Enforcement Guide: A review of Florida's pedestrian traffic laws to help with warnings, citations, and crash reports*, 2nd ed. (Waldo, Florida : Florida Department of Transportation, 2007).
[cxv] Branyan, *Pedestrian Safety Enforcement* Slide 9.
[cxvi] Zaal, *Traffic Law Enforcement* 25.
[cxvii] Ibid, 7.
[cxviii] Florida Bicycle Asso., *Florida Pedestrian Law*.
[cxix] Zaal, *Traffic Law Enforcement* 8.
[cxx] Ibid, 6.
[cxxi] Ibid, 25.
[cxxii] Nova Scotia, Service Nova Scotia & Municipal Relations, *Nova Scotia Driver's Handbook*, (Halifax, Nova Scotia: Queen Printer, 2006) : 169.
[cxxiii] Motor Vehicle Act. *R.S., s. 279 (2) & 280 c. 293*
[cxxiv] Zaal, *Traffic Law Enforcement* 28.
[cxxv] Canada, Centre of Excellence for Evaluation, *Preparing and Using Results-based Management and Accountability Frameworks*," (Ottawa : Treasury Board of Canada Secretariat, January 2005) : 2.
[cxxvi] CEE, *Preparing and Using RBMAFs*," 2-8.
[cxxvii] Virgina P. Sisiopiku, PhD., "Engineering Methods for Designing Safe Pedestrian Facilities" (ICTC Extra Workshop, N.d); Chisholm & Kennedy, "Crosswalk Safety"; Ron Van Houten, Sherry Huybers, & J. E. Louis Malenfant, "Reducing Conflicts Between Motor Vehicles and Pedestrians: The Separate and Combined Effects of Pavement Markings and A Sign Prompt." *Journal of Applied Behavioural Analysis* 37 (2004) : 445-456.
[cxxviii] Van Houten, Huybers, & Malenfant, "Reducing Conflicts" 445-456.
[cxxix] Tucson, Arizona, HAWK Operation Video (Online: Available http://www.dot.ci.tucson.az.us/traffic/HAWK.wmv); Richard B. Nassi, P.E., Ph.D. & Michael J. Barton, P.E., P.T.O.E., *HAWK Beacon Signals to Facilitate Pedestrian Crossings - Operational Report* , Paper (Presented Pittsburgh, Pennsylvania & Published, May 2006).
[cxxx] Tucson, HAWK Operation Video; Nassi, & Barton, *HAWK Beacon Signals*.
[cxxxi] Van Houten, Huybers, & Malenfant, "Reducing Conflicts" 445-456.
[cxxxii] C. V. Zegeer, et al., Safety Analysis of Marked Versus Unmarked Crosswalks in 30 Cities *74.1 Institute of Transportation Engineers. ITE Journal* (2004) : 34.
[cxxxiii] Kay Fitzpatrick, et al. *Improving Pedestrian Safety at Unsignalized Crossings*, Report No. 112 (Washington, D.C.: Transportation Research Board, 2006).
[cxxxiv] Chisholm & Kennedy, "Crosswalk Safety".
[cxxxv] National Cooperative Highway Research Program. "Accessible Pedestrian Signals: Synthesis and Guide to Best Practice." *Research Results Digest* 278, (July 2003) : Gregg Loane, Kaman Pang, & Ron Stewart, *The New TAC Accessible Pedestrian Signals Guidelines* (Saskatoon : "Innovation in Traffic Operations and Management Session" of the 2007 Annual Conference of the Transportation Association of Canada, 2007).
[cxxxvi] Safe Kids Canada, *Making it Happen*: 18-19. Risk Watch, *Risk Watch Unintentional Injuries* (Online : Available http://www.riskwatch.org/about.html) Accessed October 2007; Think First Foundation of Canada, *Think First* (Online : Available http://www.thinkfirst.ca/default.asp) Accessed October 2007; Ungar, "Seeking Balance".
[cxxxvii] Safe Kids Canada, *Making it Happen* 18-19.
[cxxxviii] ibid 18-19. Risk Watch, *Unintentional Injuries*; Think First, *Think First*; Ungar, "Seeking Balance"; Safe Kids Canada, *Child & Youth Unintentional Injury*; Victoria, Australia, *Looking out for Pedestrians* ; CICH, *Active / Safe Routes to School*.
[cxxxix] Barlow, "Road Safety Skills Training Overview"; Ungar, "Seeking Balance,"; CICH, *Active / Safe Routes to School*.
[cxl] Safe Kids Canada, *Making it Happen* 18-19. Risk Watch, *Unintentional Injuries*; Chisholm & Kennedy, "Crosswalk Safety"; Oregon, Department of Transportation, *The Safety of Pedestrians is in your Hands*, (Portland, Oregon: 2006); New Jersey, United States of America, *Pedestrians* (Online: Available http://www.nj.gov/oag/hts/pedestrian.html) Accessed August 2007; Toronto, Ontario, "City of Toronto: Transportation Services- Pedestrian Safety 'We're All Pedestrians,'" (Online: Available

http://www.toronto.ca/transportation/publications/pedestrian_safety/index.html); Accessed August 2007; San Jose, California, *Crosswalks in San Jose* (San Jose, California : Department of Transportation, 2006); Victoria, Australia, *Looking out for Pedestrians*; Halifax Regional Municipality, Nova Scotia, *Crosswalk Safety in Halifax Regional Municipality: Taking Charge of Your Own Safety* (Halifax Regional Municipality, Nova Scotia : Traffic and Right of Way Services, 2007).

[xli] Crosswalk Safety Task Force Meetings, 2007; Ken Reashor, (Halifax Regional Municipality), "Halifax Regional Municipality Crosswalk Safety Booklet." Presentation (Halifax Regional Municipality : Crosswalk Safety Task Force Meeting, 19 June 2007); HRM, *Crosswalk Safety in HRM*.

[xlii] Motor Vehicle Act. *R.S., c. 293, s. 1*; SNSMR, *Driver's Handbook*, 20-32.

[xliii] Freedom of Information and Protection of Privacy Act. *1993, c. 5, s. 1*

[xliv] D. Zaal, *Traffic Law Enforcement*, 26.

[xlv] Ibid., 30.

[xlvi] Criminal Code. Revised Statutes of Canada. 1985. Chapter C-46. Section 219-220 (Online : Department of Justice Canada <http://laws.justice.gc.ca>)

[xlvii] Criminal Code, s. 231 (7).

[xlviii] Criminal Code, s. 232 (1) (2).

[xlix] Criminal Code, s. 249 (a).